A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker

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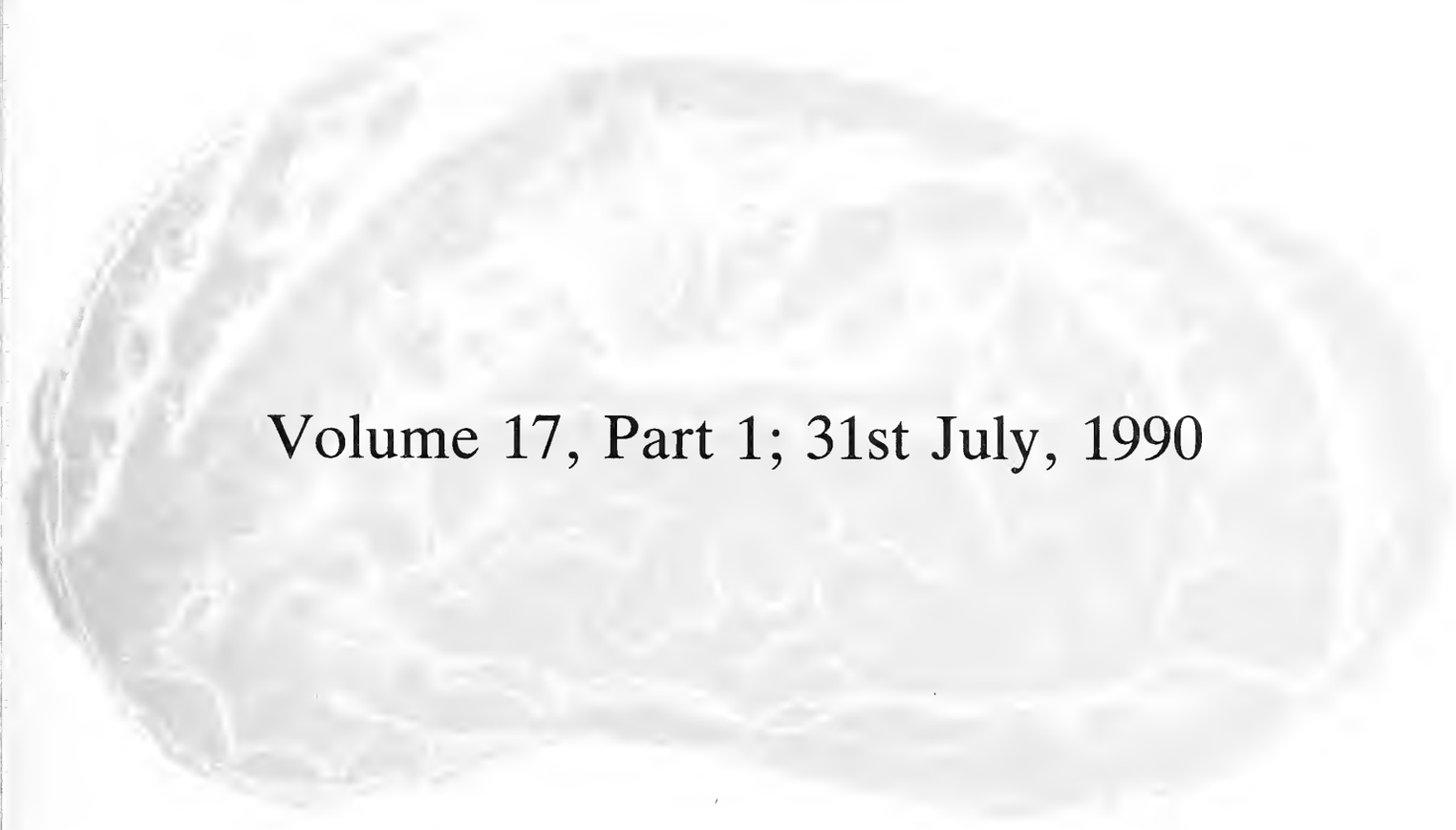

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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by only one page of text. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a male carapace (left side) of *Callistocythere murrayi* Whittaker from Mother Siller's Channel, Christchurch Harbour, Southern England; in brackish water. Photographed by J.E. Whittaker, British Museum (Natural History).

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595.336.21 (113.51) (761 : 162.087.33):551.351+552.52

ON *WELCHELLA FOVEATA* DEWEY & PUCKETT gen. et sp. nov.

by Christopher P. Dewey & T. Mark Puckett
(Mississippi State University & Alabama Geological Survey, U.S.A.)

Genus *WELCHELLA* gen. nov.
Type-species: *Welchella foveata* sp. nov.

Derivation of name: After Stewart W. Welch, who named the Pride Mountain Formation. Gender (diminutive-*ella*), feminine.

Diagnosis: Medium sized geisinid, semicircular, equivalve carapace with straight dorsum and very subdued bilobation. Wide inner lamella but lacking vestibulae. Dimorphic, females postplete, males amplete.

Remarks: *Welchella* is a geisinid (Superfamily Kloedenellacea) by virtue of the bilobation, the straight dorsum with tongue and groove hinge and the inner lamella. *Welchella* differs from *Knoxiella* Egorov, 1950 (*Trudy vses. neft. nauchno-issled. geol.-razv. Inst.*) by the postplete nature of the females and the very wide inner lamella. In *Knoxiella*, dimorphism is expressed in a posterior swelling of the female and the inner lamella is narrow.

Welchella foveata sp. nov.

Holotype: Dunn-Seiler Museum of Geology, Mississippi State University, no. **3341–1a**; ♂ carapace.
[Paratypes nos. **3341–1b** to **1e**; 1 ♀ carapace and 3 ♀ valves.]

Type locality: Section in Dry Creek Quarry, N of Trussville, Alabama, U.S.A.; Sec. 14 T16S R1W; lat. 33° 37′ 30″ N, long. 86° 37′ 30″ W. Basal Pride Mountain Formation, Chesterian, Mississippian, Carboniferous; 2.2 m above the base of the formation in black fossiliferous shale, marine.

Derivation of name: Latin *foveatus -a, -um,* pitted; referring to the surface ornament.

Figured specimens: Dunn-Seiler Museum of Geology, Mississippi State University, nos. **3341–1a** (holotype, ♀ car.: Pl. **17**, 2, figs. 1–3), **3341–1b** (paratype, ♀ RV: Pl. **17**, 4, fig. 4), **3341–1c** (paratype, ♀ car.: Pl. **17**, 2, figs. 4–6), **3341–1d** (paratype, ♀ LV: Pl. **17**, 4, fig. 3), **3341–1e** (paratype, ♀ LV: Pl. **17**, 4, fig. 1), **3341–1f** (broken valve material: Pl. **17**, 4, figs. 2, 5, 6). All from the type locality; black shale with abundant goniatites, bryozoans, brachiopods, bivalves and gastropods. From 2.2 m (nos. **3341–1a**, **3341–1e**) and 2.9 m (nos. **3341–1b**, **3341–1c**, **3341–1d** and **3341–1f**) above the base of the formation.

Explanation of Plate 17, 2

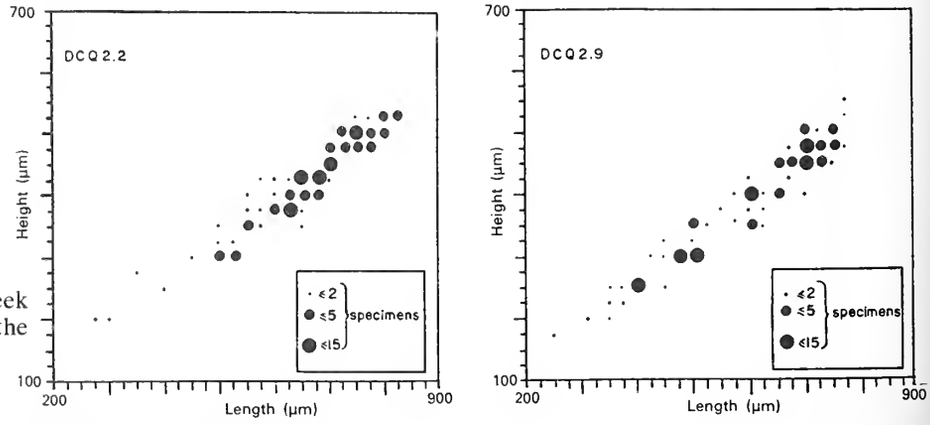
Figs. 1–3, ♂ car. (holotype, **3341–1a**, 775 μm long): fig. 1, LV ext. lat.; fig. 2, dors.; fig. 3, RV ext. lat. Figs. 4–6, ♀ car. (paratype, **3341–1c**, 775 μm long): fig. 4, LV ext. lat.; fig. 5, RV ext. lat.; fig. 6, dors. Scale A (100 μm; ×72), figs. 1–6.

Diagnosis: Medium sized (Text-fig. 1), equivalved carapace with straight dorsum. Semicircular in lateral outline, fusiform in dorsal view. Cardinal angles obtuse, distinct. Bilobation subdued, marked only by shallow, comma-shaped S2 anterior of mid-length and above mid-height. Ornamentation consists of pits over lateral surface; intensity of pitting fades to valve margins. Hinge simple, tongue and groove, adont. Wide inner lamella, narrows to cardinal angles, widest anteriorly. Vestibulae absent, inner and outer lamella fused. Dimorphic, males amplete, females postplete and slightly broader in posterior.

Remarks: *Welchella* is only known from a single species.

Distribution: Pride Moutain Formation, Chesterian, Mississippian of the Black Warrior Basin, Alabama, U.S.A. Samples collected 2.2 m and 2.9 m above the top of the Tuscumbia Limestone.

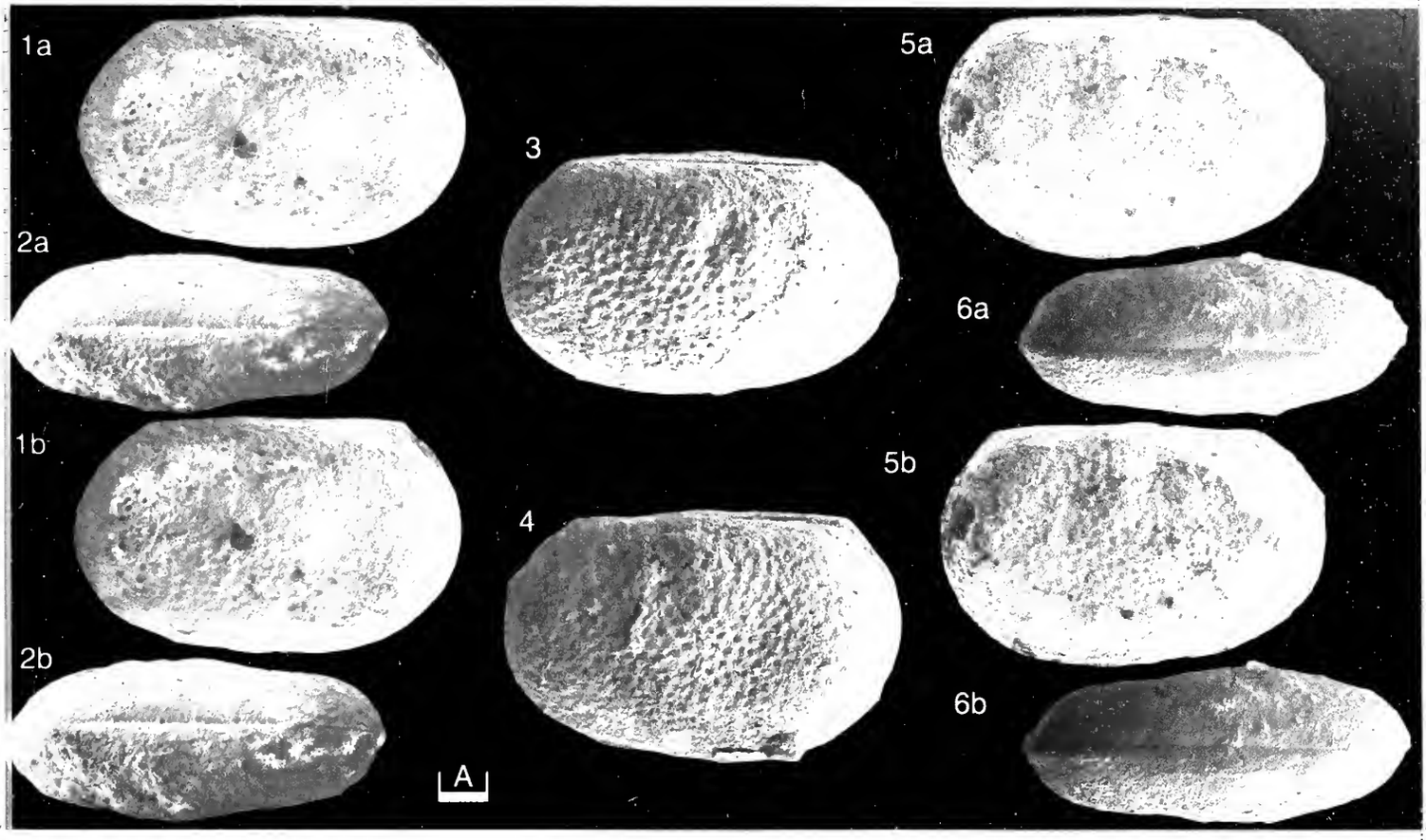
Acknowledgement: We acknowledge the financial support given by the Donors of the Petroleum Research Fund administered by the American Chemical Society; the Mississippi Mineral Resources Institute and Mississippi State University.



Text-fig. 1. Ontogeny of *W. foveata* from Dry Creek Quarry at 2.2 m and 2.9 m above the base of the Pride Mountain Formation.

Explanation of Plate 17, 4

Fig. 1, ♀ LV, ext. lat. (paratype, **3341–1e**, 725 μm long); fig. 2, ant. valve wall and inner lamella (27 μm thick, broken valve material, **3341–1f**); fig. 3, ♀ LV, int. lat. (paratype **3341–1d**, 725 μm long); fig. 4, ♀ RV, int. lat. (paratype **3341–1b**, 725 μm long); figs. 5, 6, post. valve wall (25 μm thick, broken valve material, **3341–1f**).
Scale A (100 μm; ×72), figs. 1, 3, 4; scale B (100 μm; ×180), figs. 2, 5; scale C (10 μm; ×2000), fig. 6.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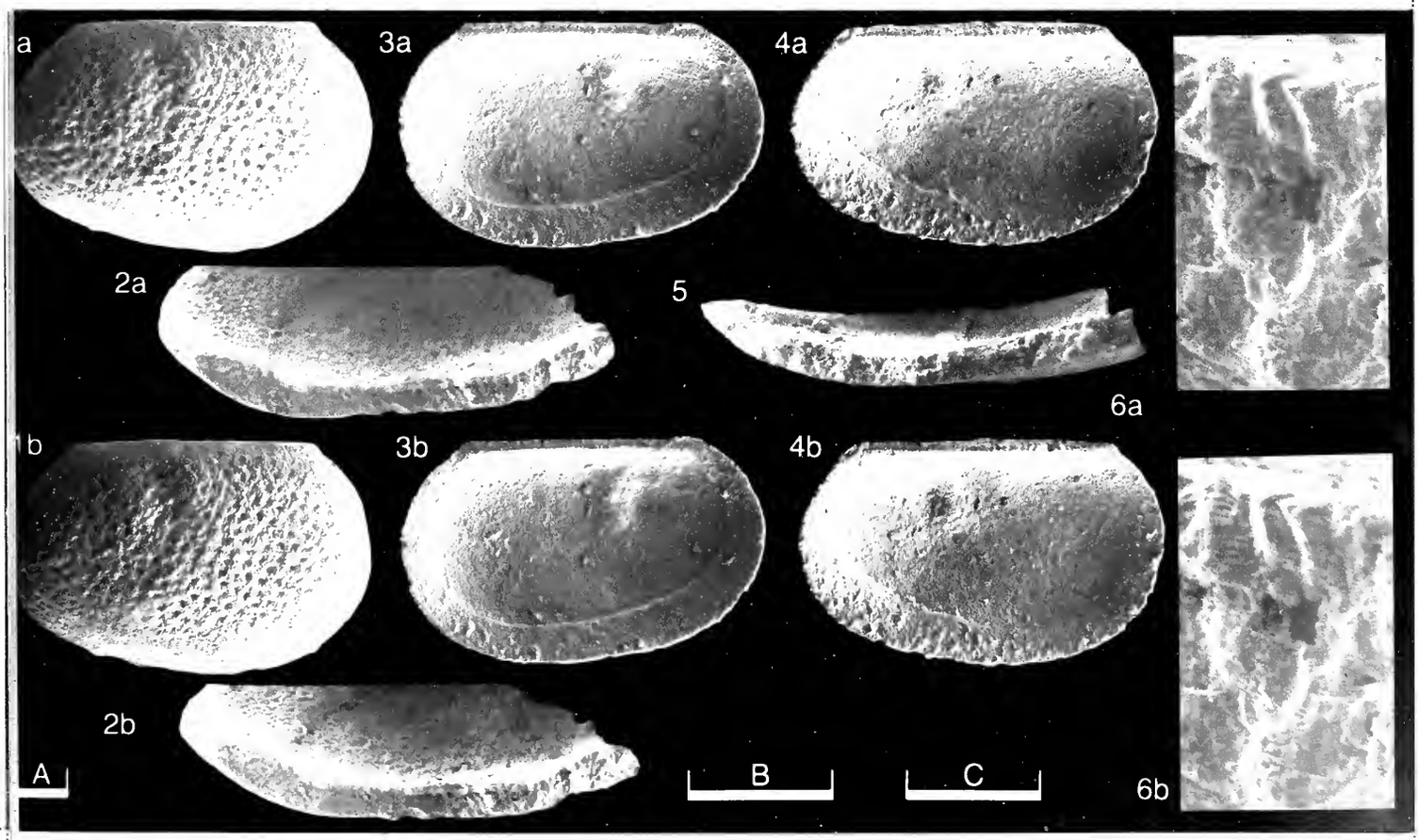
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595.336.21 (113.51) (761 : 162.088.34 + 773 : 162.089.37) : 551.351 + 552.52

ON *GLYPTOPLEURA HENBESTI* CRONEIS & GUTKE

by Christopher P. Dewey
(Mississippi State University, Mississippi, U.S.A.)

Glyptopleura henbesti Croneis & Gutke, 1939

1939 *Glyptopleura henbesti* n. sp. C. Croneis & R. L. Gutke, *J. scient. Labs Denison Univ.*, **34**, 51, 52, pl. 2, figs. 7, 8.
1939 *Glyptopleura hendricksi* n. sp. C. Croneis & R. L. Gutke, *Ibid.*, **34**, 52, 3, pl. 2, figs. 5, 6.
1941 *Glyptopleura henbesti* Croneis & Gutke; C. L. Cooper, *Rep. Invest. Ill. St. geol. Surv.*, no. 77, 40, 41, pl. 7, figs. 9–11.

Holotype: Field Museum of Natural History, Chicago, U.S.A., no. **UC 45169**; female carapace.

Type locality: Locality no. .0526.42; greenish-grey non-laminated, fossiliferous clay-shale; W side of road, at base of Melcher Hill, Sec. 26, T12S R7E, N of Shetlerville, Hardin County, Illinois, U.S.A.; lat. 37° 26′ 29″ N, long. 88° 24′ 21″ W. Renault Formation, Chesterian, Mississippian, Carboniferous.

Figured specimens: Field Museum of Natural History, U.S.A., nos. **UC 45169** (holotype, ♀ car.: Pl. **17**, 8, figs. 2, 3), **UC 51725** (paratype, ♀ car.: Pl. **17**, 6, figs. 1, 2), **UC 45170** (♂ car. [holotype of *G. hendricksi*]: Pl. **17**, 8, figs. 1, 2). Illinois State Geological Survey, U.S.A., no. **ISGS 45P131** (♀ car.: Pl. **17**, 8, fig. 5). Dunn-Seiler Museum of Geology, Mississippi State University, U.S.A., no. **3341–2** (♀ LV: Pl. **17**, 6, figs. 3, 4).

Nos. **UC 45169** and **51725** are from the type locality. **UC 45170** is from locality no. .0526.41, N of Shetlerville, Illinois; lat. 37° 26′ 23″ N, long. 88° 24′ 21″ W. **ISGS 45P131** is from Sec. 11, T12S, R7E, S of Eichorn, Hardin County, Illinois; lat. 37° 29′ 20″ N, long. 88° 24′ 20″ W. All from Renault Formation, Chesterian, Mississippian, Carboniferous. **3341–2** is from light brown fossiliferous mudstone, county highway 37, Sec. 31, T5S R10W, Colbert County, Alabama; lat. 34° 34′ 12″ N, long. 87° 37′ 28″ W; Bangor Limestone Formation, Chesterian. Mississippian, Carboniferous.

Diagnosis: Medium-sized, subquadrate, bilobate distinct S2 at mid-length, ends evenly rounded, left valve larger than right. Dorsum straight, cardinal angles obtuse, distinct. Dorsal aspect cuneate, posterior acuminate, anterior blunt, maximum width in posterior. Lateral surface has six, major, striate costae (Text-fig. 1) subparallel to

Explanation of Plate 17, 6

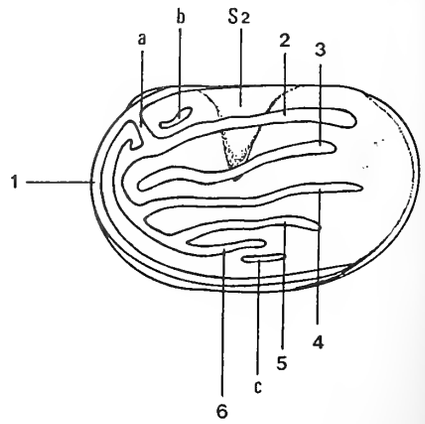
Figs. 1, 2, ♀ car. (paratype, **UC 51725**, 840 μm long): fig. 1, ext. vent.; fig. 2, RV, ext. lat. Figs. 3, 4, ♀ LV (**3341–2**, 900 μm long): fig. 3, lat. ext. anterodors.; fig. 4, ext. lat. Scale A (100 μm; ×65), figs. 1, 2, 4; scale B (50 μm; ×295), fig. 3.

long axis. Costa 1 is marginal and fades posteriorly. Costae 2 and 6 form "U", closed anteriorly but with short anterodorsal extension "a"; costa 3 not connected to "U"; costae 4 and 5 extend posteriorly from loop of "U". Two minor costae (a and b) at 90° in anterodorsal region; "b" posterior to "a", subparallel to costa 2. Third minor costa ("c") ventral to costa 6. Costae do not extend beyond the posterior lobe; costae 2 and 4 end as short spines. Surface also reticulate and papillate. Posterior free margin denticulate. Dimorphic, females wider posteriorly.

Remarks: Intraspecific variation of the multicostate pattern in the genus *Glyptopleura* Girty, 1910, is common. Variations in the costae can occur on either valve of a single carapace (I. G. Sohn, *Prof. Pap. U.S. geol. Surv.*, **606F**, 47, 1969), or between the sexes, adults of the same sex or instars and adults. Normally the number and general position of the costae are constant within a species; however the length, exact position and anastomoses of costae may be variable. *G. hendricksi* is placed in synonymy with *G. henbesti* because the variation in the posterior portion of the carapace (Pl. **17**, 8, fig. 2) is a dimorphic character and the only costa in *G. hendricksi* to show any significant difference is the marginal costa, which is formed from separate dorsal and ventral costae that fade as they pass each other and wrap around the anterior margin.

Distribution: Illinois Basin, Illinois and Black Warrior Basin, Alabama; Chesterian, Mississippian, Carboniferous.

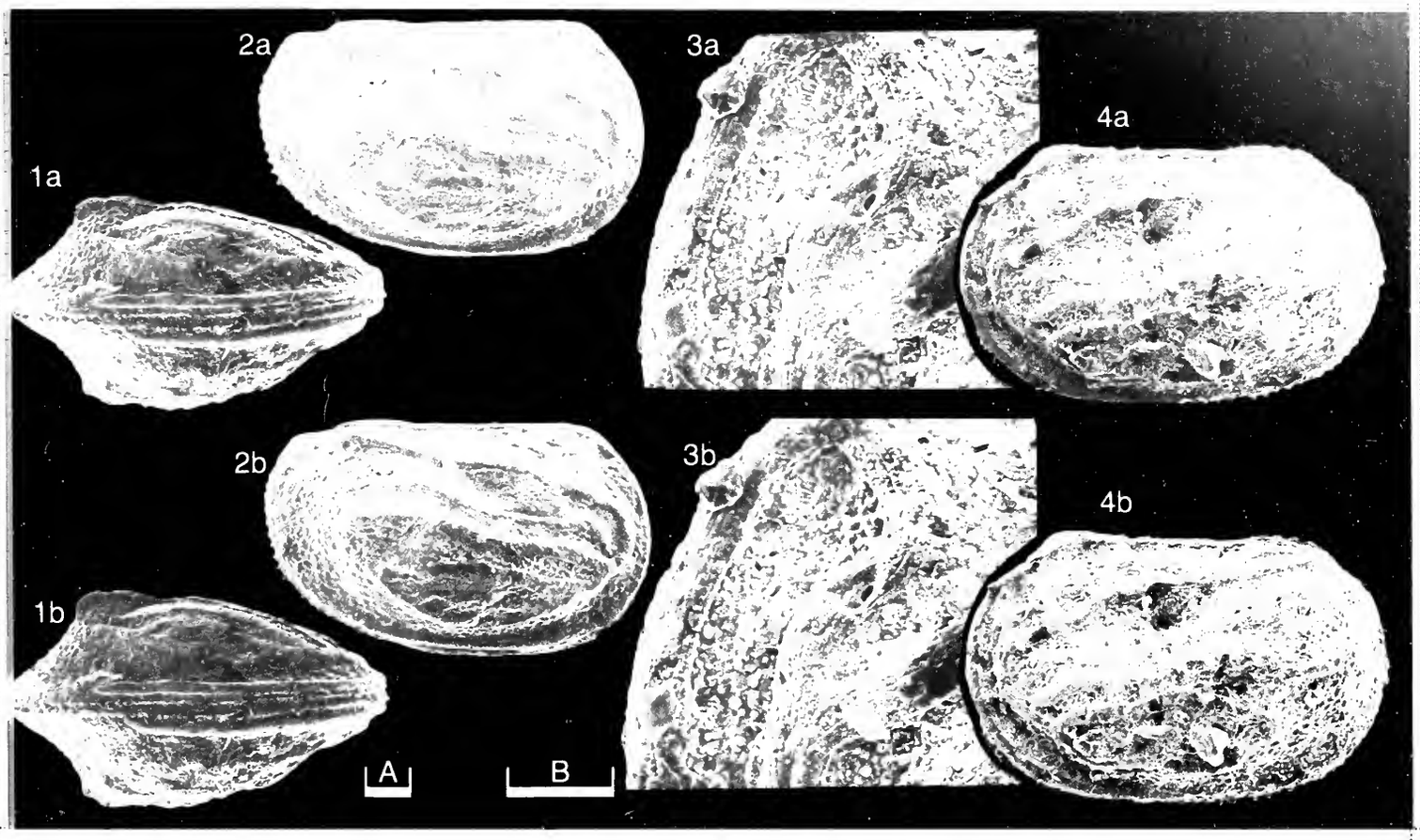
Acknowledgement: I acknowledge the financial support given by the Donors of the Petroleum Research Fund administered by the American Chemical Society; the Mississippi Mineral Resources Institute and Mississippi State University.



Text-fig. 1. Costae, left valve of *G. henbesti*.

Explanation of Plate 17, 8

Figs. 1, 2, ♀ car. (**UC 45170**, 840 μm long): fig. 1, LV, lat. ext.; fig. 2, ext. dors. Figs. 3, 4, ♀ car. (holotype, **45169**, 840 μm long): fig. 3, LV, ext. lat.; fig. 4, ext. dors. Fig. 5, ♀ car. (**ISGS 45P131**, 840 μm long), LV, ext. lat. Scale A (100 μm; ×65), figs. 1–5.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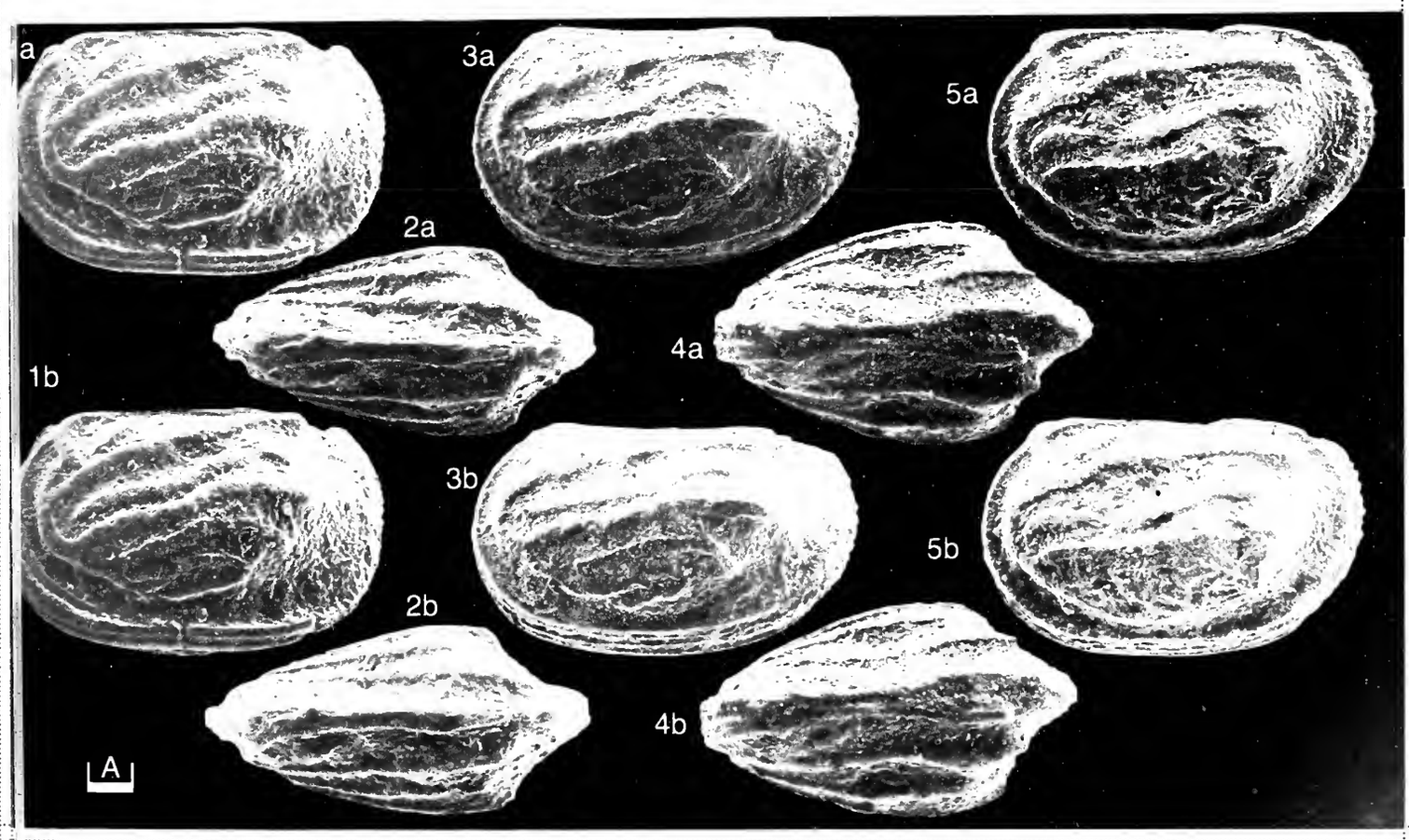
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595.336.13 (113.312) (766 : 162.097.34) 551.351 + 552.54

ON *WINCHELLATIA LONGISPINA* KAY

by Mark Williams
(University of Leicester, England)

Genus WINCHELLATIA Kay, 1940

Type-species (by original designation): *Winchellatia longispina* Kay, 1940

Diagnosis: Unisulcate Glossomorphitinid; S2 sigmoidal, beginning slightly dorsal of dimunitive preadductorial node, continued ventrally and defining anterior and ventral termination of posteroventral lobe and confluent ventrally with distinct laterovelar furrow. Dimorphic in some species. Tecnomorphic velum a narrow flange beginning posteroventrally, continues to near anterocardinal corner, much wider ventrally in heteromorph. Posteroventral lobe inflated with a distinct spine.

Remarks: *Winchellatia* is most similar to *Collibolbina* Schallreuter (1967, *Neues Jb. Geol. Paläont. Mh.* **7**, 431–446) differing only in having a row of spines admarginally and by having S2 continuous ventrally with the laterovelar furrow. Schallreuter (pers. comm.) considers that *Collibolbina* may be a subgenus of *Winchellatia*.

The type-species of *Acronotella, A. schilderi* Ulrich & Bassler (*Maryland Geol. Surv., Silurian Volume*, 298, text-figs. 25–27, 1923), is very similar to *W. longispina* (see also *Treatise of Invertebrate Paleontology* part Q, fig. 186, 1a, b, 1961) in having a strong laterally projecting spine on the posteroventral lobe, a strong S2, and a similar outline. *Acronotella* appears to differ from *Winchellatia* by the lack of the confluence of S2 with the strong laterovelar furrow and by having strong anterocardinal spines.

At present *Winchellatia* includes a large number of species showing a wide range of morphology. *W. minnesotensis* Kay (1940, *op. cit.* 225, pl. 32, figs. 13–19), *W. lansigensis* Kay (1940, *op. cit.*, 254, pl. 32, figs. 6–8) and *W. nahanniensis* Copeland (1982, *Bull. geol. Surv. Can.*, **347**, 16 pl. 3, figs. 16, 25–30) are not known to de dimorphic and are here questionably assigned to *Winchellatia. W.? bullata* Pribyl (*Sb. nar. mus. Praze*, **33**,64, text-fig. 2, fig. 9, pl. 12, fig. 4, 1977) is non-dimorphic, very large, has no spines or marginal tubercles and almost certainly belongs in a separate genus. Several Devonian species have also been assigned to *Winchellatia* by Kesling & Tabor (*J. Paleont.*, **26**, 761–763, 1952; *Contr. Mus. Paleont. Univ. Mich.*, **10**,

Explanation of Plate 17, 10

Fig. 1–3, ♀ LV. (**OS 13471**, 1 mm long): fig.1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, ext. vent. Fig. 4, ♀ RV ext. lat. (**OS 13472**, 1.02 mm long).

83–100, 1953); the lobation and sulcation of these species is quite unlike that of *Winchellatia*. Other features which characterise species of *Winchellatia* include the bending of the velum towards the margin posteriorly and the presence of an admarginal ridge surmounted by tubercles on both valves. This ridge can be seen to migrate towards the velum anteroventrally, a feature also described in *Collibolbina* (Schallreuter, 1967).

Winchellatia longispina Kay, 1940

1940 *Winchellatia longispina* n. sp. G. M. Kay, *J. Paleont.*, **10**, 235, pl. 32, figs. 1–5.
1957 *Winchellatia longispina* Kay; R. W. Harris, *Bull. Okla geol. Surv.*, **75**, 220, pl. 9, figs. 9a–d, 10, 11a–d.
1957 *Winchellatia cornuta* n. sp. R. W. Harris, *Bull. Okla geol. Surv.*, **75**, 220, pl. 9, figs. 4a, b.
1965 *Winchellatia longispina* Kay; M. J. Copeland, *Bull. geol. Surv. Can.*, **127**, 20, pl. 10, fig. 6.

Holotype: University of Columbia, U.S.A., Department of Geology, no. **275861**; ♀ left valve.

Type locality: Gutenburg Member, Decorah Formation, middle Ordovician, Church, Iowa, U.S.A. (see Kay, 1940).

Figured specimens: British Museum (Nat. Hist.) nos. **OS 13471** (♀ LV: Pl. **17**, 10, figs. 1–3; Pl. **17**, 12, fig. 2), **OS 13472** (♀ RV: Pl. **17**, 10, fig. 4; Pl. **17**, 12, fig. 1), **OS 13479** (♂ RV: Pl. **17**, 12, fig. 3), **OS 13473** (♂ LV: Pl. **17**, 12, fig. 4), **OS 13474** (♀ RV: Pl. **17**, 12, fig. 5). All figured specimens from the Pooleville Member, Bromide Formation, Rock Crossing, in the Criner Hills (see Harris, 1957), Oklahoma, U.S.A.; approximately latitude 34° 08′ N, longitude 97° 10′ W.

Diagnosis: *Winchellatia* species with an elongate, posteroventrally directed spine on the posteroventral lobe. Subvelar field with marginal finely tuberculate ridge present on both valves.

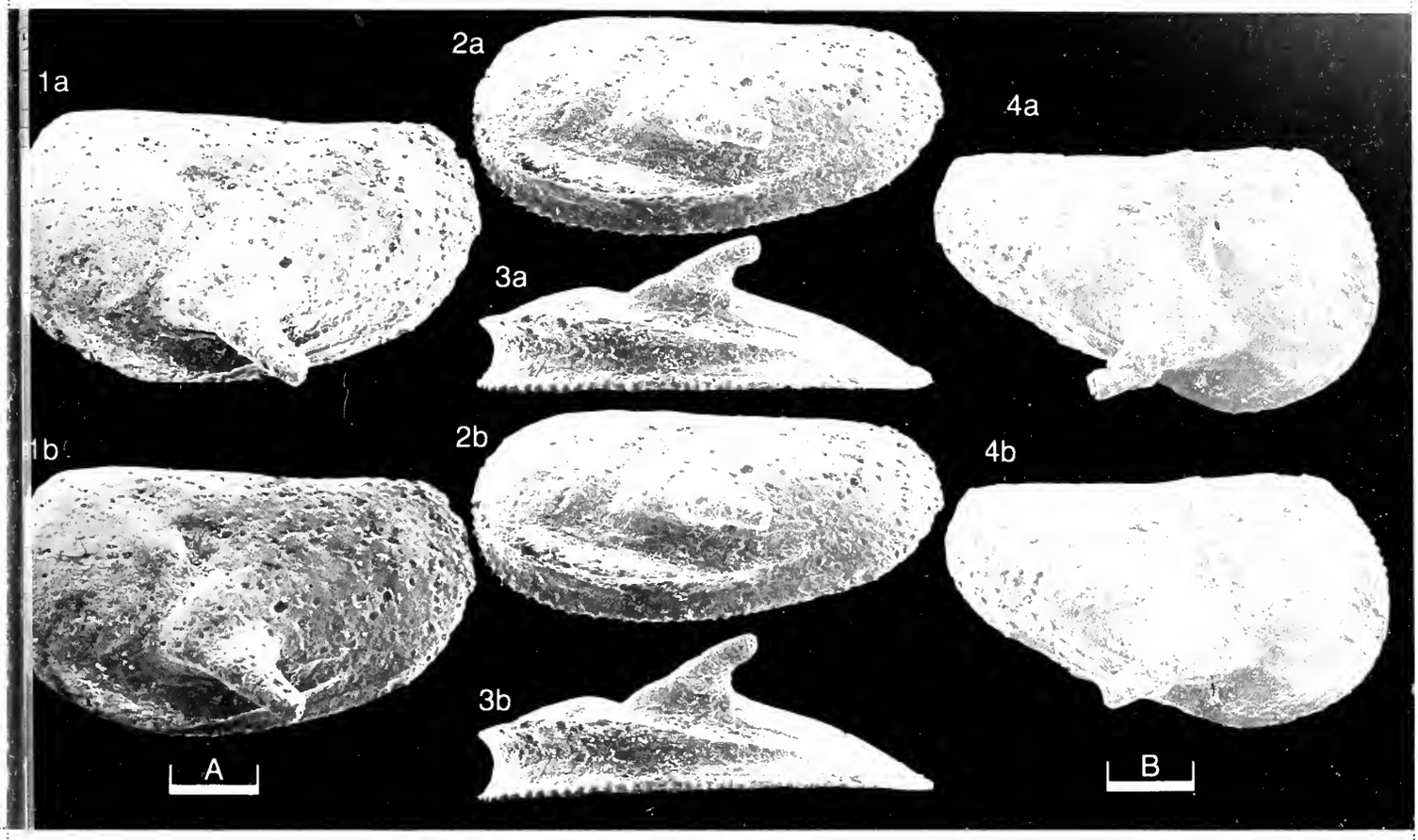
Remarks: The holotype of *Winchellatia cornuta* Harris, 1957 (Museum of Comparative Zoology, Harvard University, U.S.A., no. **4615**) is a badly abraded specimen of *W. longispina*. Juveniles have the strong marginal ridge of adults, but the velum is weaker, being developed only as a right angled bend. The preadductorial node and S2 are also weaker in juveniles. The subelar field is smooth in all of the heteromorphic (♀) specimens examined, but in tecnomorphs it is distinctly reticulate.

Distribution: Middle Ordovician of the U.S.A.: Gutenburg Member, Decorah Formation, Iowa and the Bromide Formation, Oklahoma.

Acknowledgement: Drs. R. E. L. Schallreuter (Hamburg) and D. J. Siveter (Leicester), for discussion.

Explanation of Plate 17, 12

Fig. 1, ♀ RV, ext. ant. (**OS 13472**, 1.02 mm long); fig. 2, ♀ LV, ext. ant. (**OS 13471**, 1 mm long); fig. 3, ♂ RV, ext. lat. (**OS 13479**, 1 mm long); fig. 4, ♂ LV, int. lat. (**OS 13473**, 1 mm long); fig. 5, ♀ RV, close up of ant. vent. (**OS 13474**, fragment). Scale A (200 μm; ×66), figs. 1–4; scale B (100 μm; ×75), fig. 5.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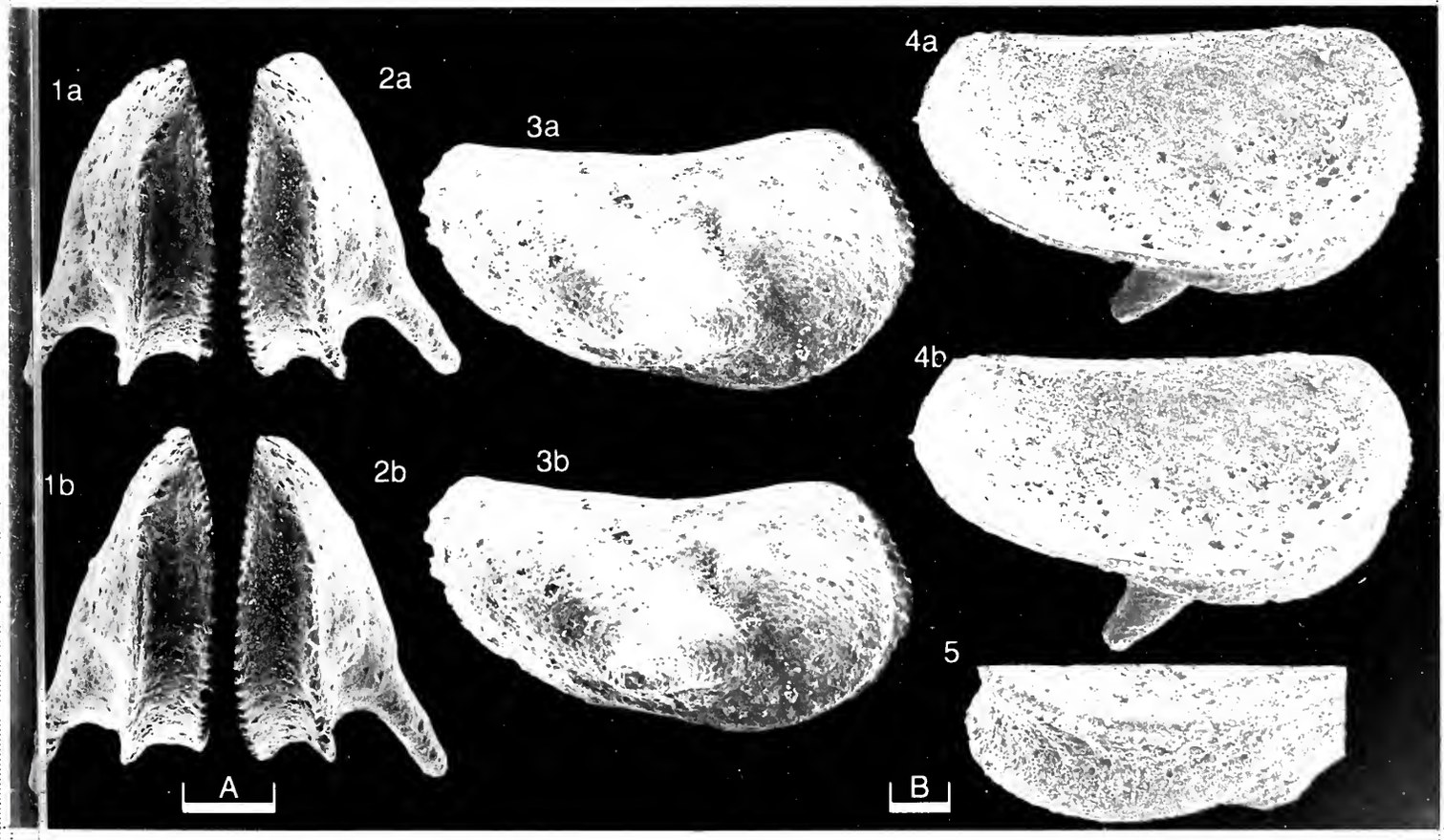
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595.336 (113.312) (766 : 162.097.34) 551.351 + 552.52

ON *ERIDOCONCHA SIMPSONI* HARRIS

by Mark Williams & Peter J. Jones
(University of Leicester, England & Bureau of Mineral Resources, Canberra, Australia)

Eridoconcha simpsoni Harris, 1931

1931 *Eridoconcha simpsoni* n. sp. R. W. Harris, *Bull. Okla geol. Surv.*, **55**, 90, pl. 14, figs. 1a, b, pl. 11. figs. 1a–d.
1934 *Eridoconcha simpsoni* Harris; R. S, Bassler & B. Kellett, *Spec. Pap. geol. Soc. Am.*. **1**, 310.
1951 *Eridoconcha simpsoni* Harris; J. E. Keenan, *J. Paleont.*, **25**, 565.
1951 *Cryptophyllus simpsoni* (Harris); S. A. Levinson, *J. Paleont.*, **25**, 558.
1957 *Cryptophyllus simpsoni* (Harris); R. W. Harris, *Bull. Okla geol. Surv.*, **75**, 183, pl. 5, figs. 12a, 13a, b, 14a, b, 15a, b.
1961 *Aberroconcha? simpsoni* (Harris); F. J. Adamczak, *Acta palaeont. pl.*, **6**, 73.
1962 *Cryptophyllus simpsoni* (Harris); P. J. Jones, *Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, **62–3**, 19.
1968 *Eridoconcha? simpsoni* Harris; R. E. L. Schallreuter, *Palaeont. Z.*, **42**, 109.

Holotype: Museum of Comparative Zoology, Harvard University, U.S.A., no. **7447**; carapace (ninth lamellae damaged).

Type locality: From C. E. Decker's 'Zone 16' (see Harris, 1957), Bromide Formation, Simpson Group, middle Ordovician; about 400 m W of U.S. Highway 77 (sec. 25 T. 2s, R.1 E), Arbuckle Mountains, Oklahoma, U.S.A.; approximately lat. 34°25′ N., long. 97°08′ W.

Figured specimens: Museum of Comparative Zoology, Harvard University, U.S.A., no.**7447** (car.: Pl. **17**, 16, fig. 1). Commonwealth Palaeontological Collections, Canberra, Australia nos. **CPC 28741** (LV: Pl. **17**, 16, fig. 4) and **CPC 28472** (RV: Pl. **17**, 16, fig. 5). British Museum (Nat. Hist.) nos. **OS 13477** (LV: Pl. **17**, 14, figs. 1–5; Pl. **17**, 16, fig. 1), **OS 13476** (RV: Pl. **17**, 16, fig. 3), **OS 13475** (LV: Pl. **17**, 16, fig. 6).

Explanation of Plate 17, 14

Figs. 1–5, LV (**OS 13477**, 0.77 mm long): fig. 1, ext. lat.; fig. 2, ext. lat obl.; fig. 3, dors obl.; fig. 4, vent.; fig. 5, ant. Scale A (200 μmm; ×76), figs. 1–5.

All of the figured specimens come from the Bromide Formation. **MCZ 7447** is from the type horizon and locality. **CPC 28741** and **28742** are from Decker's 'Zone 35', Mountain Lake Member, Highway 99 road section (see Harris, 1957), collected by V. Jaanusson (1959). **OS 13475** to **13577** are from the top bed of the Mountain Lake Member, Bromide Formation, North Interstate 35 locality (see Fay & Grafham, *Univ. Kans. paleont. Contr.*, Monograph, **1**, 14, 1982).

Diagnosis: Species of *Eridoconcha* with naupliconch having an elongated posteriorly directed spine, Maximum of nine lamellae, each delimited by wide "U"-shaped grooves. Greatest valve width ventral of umbo at second to third lamellae. Final lamella preplete in lateral outline. Internal adductorial sulcament strongly developed.

Remarks: Levinson (1951) assigned *E. simpsoni* to his new genus *Cryptophyllus*. However, the adventral structures and deep "U"-shaped grooves (Text-fig. 1) between the lamellae in *E. simpsoni* clearly distinguishes it from the type-species of *Cryptophyllus*, *C. oboloides* (Ulrich & Bassler, 1923).

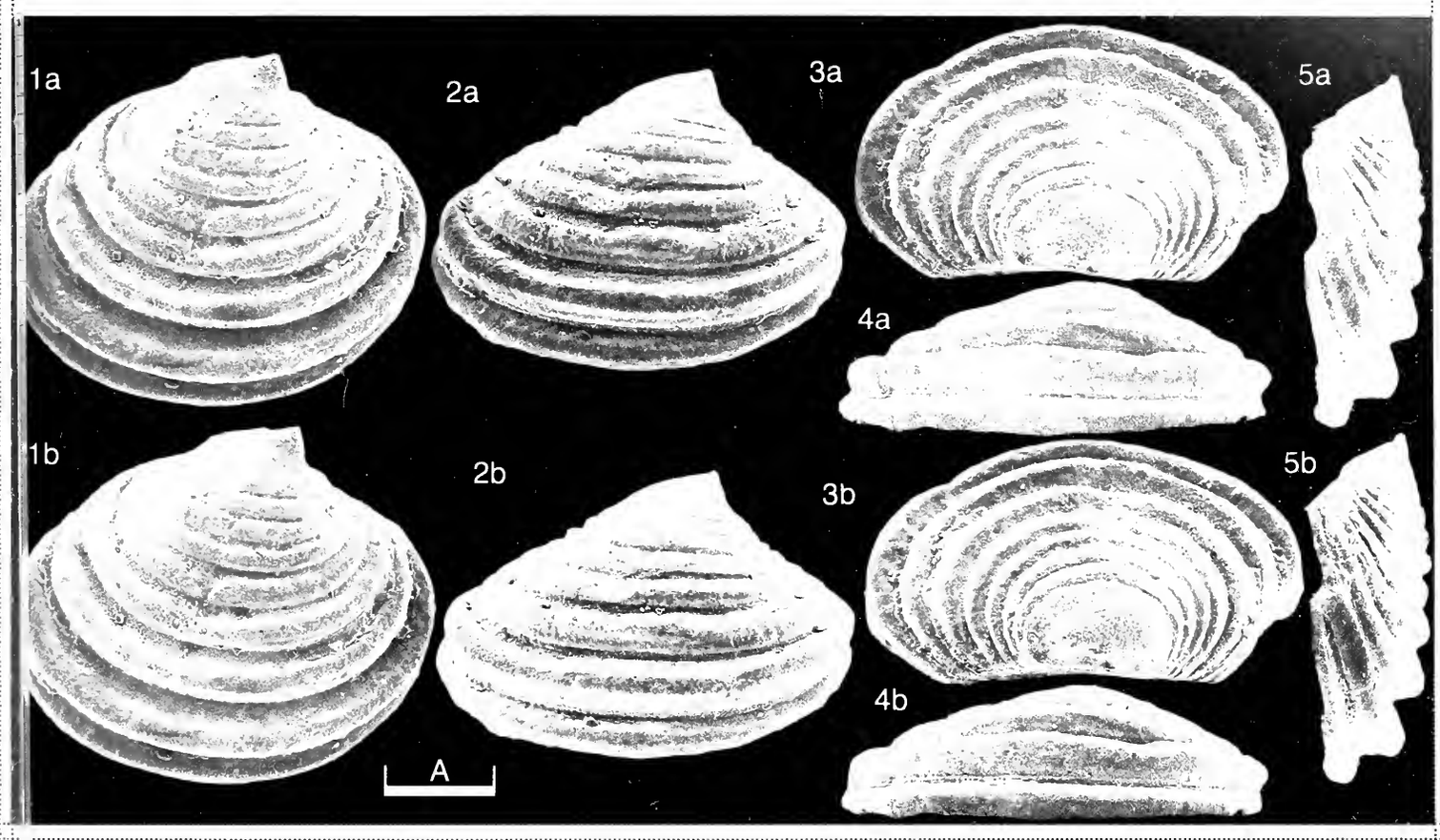
E. rugosa, the type-species of *Eridoconcha* Ulrich & Bassler, 1923, has recently been examined by Warshauer & Berdan (*Prof. Pap. U.S. geol. Surv.*, **1066-H**, 1982), and by P. J. Jones. It possesses up to four lamellae, each with a distinct adventral structure (a swollen rib) situated some distance from its free margin, a character diagnostic of the genus as a whole, and recognised in *E. simpsoni* (Text-fig. 1). *E. simpsoni* is readily distinguished from *E. rugosa* by its consistently greater number of lamellae.

From his figures it is clear that Harris (1957, pl. 5, figs. 14a, b, 15a, b, 12) considered *E. simpsoni* to be dimorphic, with males more elongate than females. No such dimorphism has been recognised by us. Based on specimens recovered from several samples, *E. simpsoni* shows quite wide adult size variation (Text-figs. 2, 3). Wide intraspecific variation of the carapace outline is also a noted feature (see above) of the species.

Explanation of Plate 17, 16

Fig. 1, LV, post. (**OS 13477**, 0.77 mm); fig. 2, car., ext. Lt. lat. (**MCZ 7447**, 0.6 mm long); fig. 3, RV, int. lat. (**OS 13476**, 0.73 mm long); fig. 4, LV, detail int. vent. showing contact groove (**CPC 28741**, 0.63 mm); fig. 5, RV, detail int. vent. (**CPC 28742**, 0.55 mm); fig. 6, int. lat. (**OS 13475**, 0.75 mm).

Scale A (200 μm; ×76), fig. 1; scale B (100 μm; ×95), fig. 2; scale C (150 μm; ×72), figs. 3, 6; scale D (100 μm; ×81), fig. 4; scale E (100 μm; ×87), fig. 5.


1a
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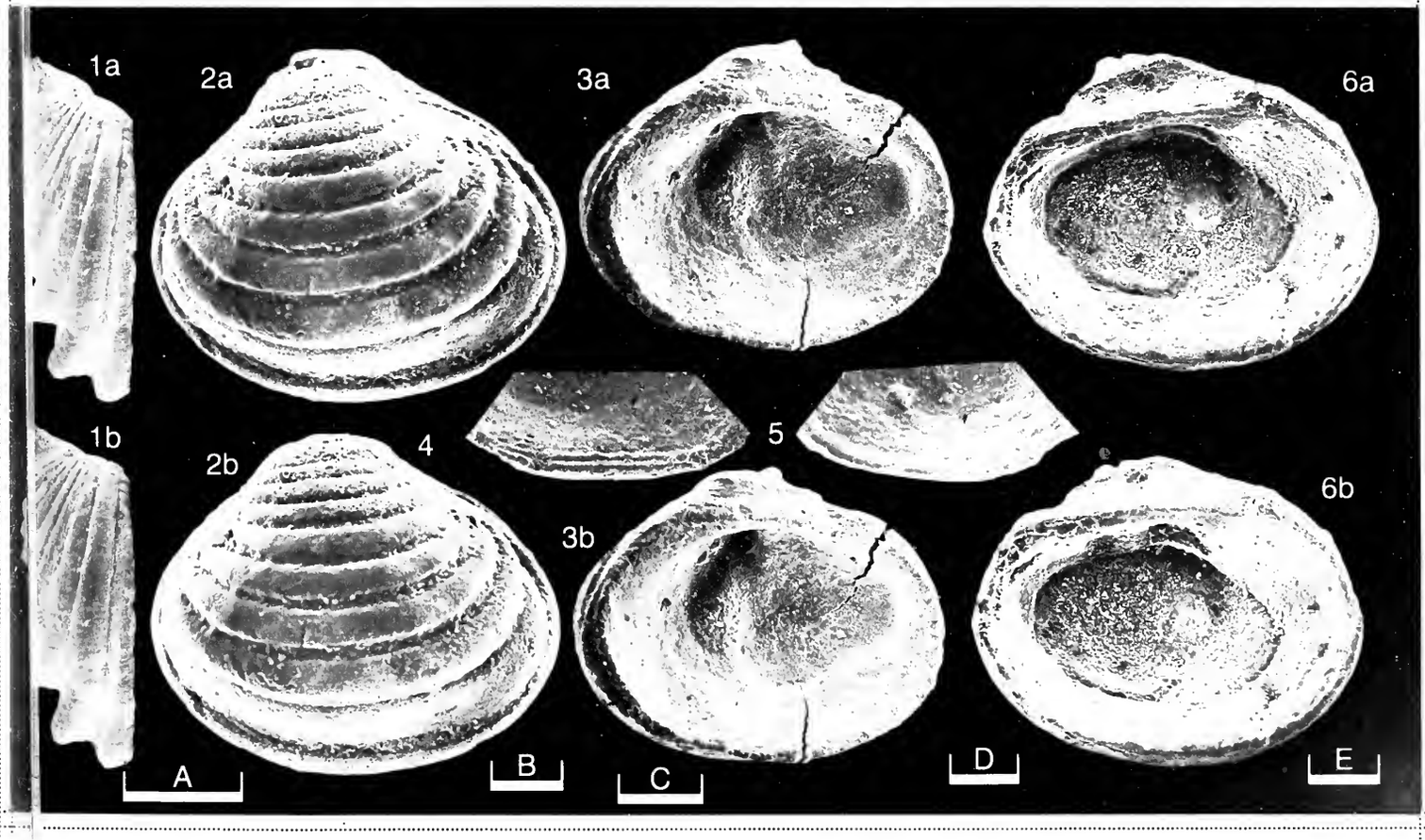
4b
A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3a
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4
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6b
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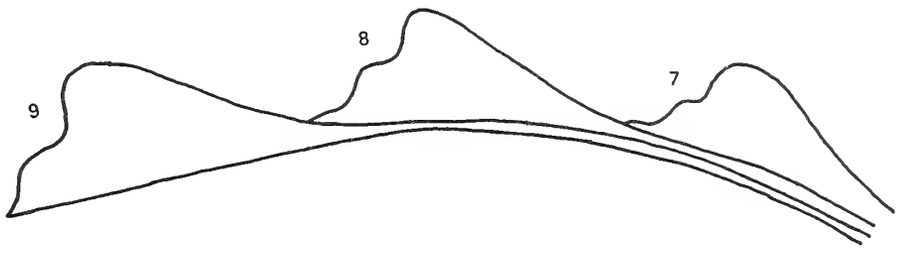
A
B
C
D
E

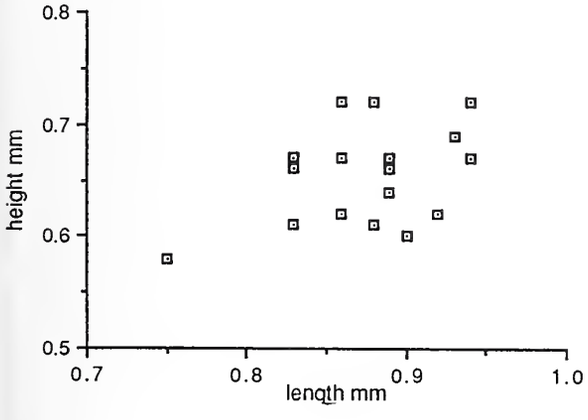
A marked contact groove exists in the last lamella of the left valve, which receives a rudimentary contact list of the right valve (Pl. **17**, 16, figs. 4,5). Carapaces display left over right valve overlap. The right valve hinge appears to have a distinct groove; there is a ridge in the opposing position in the left valve.

E. simpsoni occurs in the Bromide Formation together with other eridostracans (*C. gibbosum* Harris, 1957 and *C. nuculopsis* Harris, 1957), where they characterise the deeper water platform biofacies, as they do in other N. American sequences (see M. J. Copeland, *Bull. geol. Surv. Can.*, **127**, 1982). It is readily distinguished from these species on the basis of the surface relief of the lamellae.

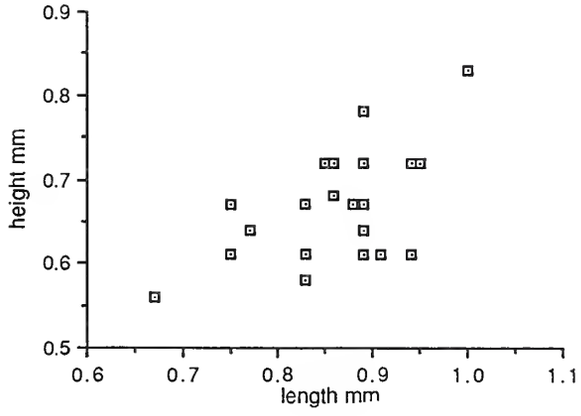
Distribution: *E. simpsoni* characterises marine offshore shelf facies in the middle Ordovician Bromide Formation, Oklahoma, U.S.A.



Text-fig. 1. Schematic cross-section of the adventral ridges of the 7th, 8th and 9th lamellae of *E. simpsoni*.



Text-fig. 2. Size dispersion of 17 adult left valves of *E. simpsoni* from three samples in the Mountain Lake Member, Bromide Formation, Oklahoma, U.S.A.



Text-fig. 3. Size dispersion of 21 adult right valves of *E. simpsoni* from three samples in the Mountain Lake Member, Bromide Formation, Oklahoma, U.S.A.

ON *CYPRIDEA UNICOSTATA* GALEEVA *CHINENSIS* NEALE & SU subsp. nov.

by John W. Neale & Su Deying

(University of Hull, England & Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China)

Cypridea unicostata Galeeva *chinensis* subsp. nov.

1980 *Cypridea unicostata* Galeeva; Su Deying, Li Yougui, Pang Qiqing & Chen Sue, *The Mesozoic strata and paleontology in Shanganning Basin, part 2. Fossil Ostracoda*, Geological Publishing House, Beijing, 77, pl. 116, figs. 2a–f.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China, coll. no. **10.2**; carapace.

Type locality: Jingchuan Formation, Zhidan Group, Wujiamiao (= Wujia or Wuyia Temple), Shanganning Basin, lat. 40°23′N, long. 107°49′E. Hauterivian-Barremian, Early Cretaceous.

Derivation of name: From its wide occurrence in China.

Figured Specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China, coll. nos. **10.1** (car.: Pl. **17**, 20, fig. 1), **10.2** (holotype, car.: Pl. **17**, 20, fig. 3), **10.3** (LV: Pl. **17**, 22, fig. 1), **10.4** (car.: Pl. **17**, 20, fig. 2), **10.5** (car.: Pl. **17**, 22, fig. 3), **10.6** (car.: Pl. **17**, 22, fig. 2). All from the type locality and horizon.

Diagnosis: A subspecies of *Cypridea unicostata* Galeeva characterised by the development of strong tuberculation and strong over-reach of the right valve by the left valve.

Remarks: Most forms which approach *C. unicostata chinensis* in ornamentation are more rectangular in shape as exemplified by the British Middle Purbeck, *C. granulosa* (J. de C. Sowerby, 1836) (*in* W. H. Fitton, *Trans. geol. Soc. Lond.*, ser. 2, **4**, 345, pl. 2, fig. 4), the Wyoming Early Cretaceous species, *C. wyomingensis* Jones, 1893 (*Geol. Mag.*, dec. 3, **10**, 386, pl. 15, figs. 5, 6), or the Rocky

Explanation of Plate 17, 20

Fig. 1, car., ext. rt. lat. (**10.1**, 985 μm long); fig. 2, car., ext. dors. (**10.4**, 1010 μm long); fig. 3, car., ext. lt. lat. (holotype, **10.2**, 990 μm long).

Scale A (200 μm; ×66), figs. 1–3.

Mountain Early Cretaceous *C. compta* Peck, 1941 (*J. Paleont.*, **15**, 300, pl. 44, figs. 25–28). Among British species, *C. coelnothi* Anderson, 1971 (*Bull. geol. Surv. Gt Br.*, **34**, 56, pl. 13, fig. 3), from the Middle Purbeck, is generally similar in form and ornamentation but is more humped anterodorsally in side view; *C. comptonensis* Anderson, 1967 (*Bull. Geol. Surv. Gt Br.*, **27**, 242, pl. 16, figs. 1–4, 9, 18–20), from the *C. clavata* Zone, shows a less strong dorsal overlap and lacks the concavity in the dorsal margin, but is otherwise similar. *C. tuberculata* (Sowerby) *langtonensis* Anderson, 1971 (*op. cit.*, 88, pl. 13, fig. 4), from the Middle Purbeck *C. vidrana* Zone, is also similar but our new taxon tapers more posteriorly. Elsewhere, it differs from *C. koskulensis* Mandelstam, 1958 (*Trudy vses. neft. nauchno-issled. geol.-razv. Inst.*, **9**, 269, pl. 5, figs. 1, 2), from the Barremian of the Embensk Region of Russia, in its concave anterodorsal right valve margin. In our opinion, however, its general shape, ventral ridge and other features suggest the closest affinity with *C. unicostata* Galeeva, 1955 (*Cretaceous ostracods of the Mongolian People's Republic*, Gostoptekhizdat, Moskow, 35, pl. 4, figs. 2a–d), from the Early Cretaceous Dzunbainsk Formation of Mongolia. In the general shape of the carapace in side view (see our Pl. **17**, 20, fig. 3), our taxon is almost identical with Galeeva's holotype, but the well developed tuberculation of *chinensis* has a marked effect on the outline in dorsal and ventral views (compare our Pl. **17**, 20, fig. 2 and Pl. **17**, 22, fig. 2, with Galeeva's pl. 4, figs. 2b, d). Galeeva's diagnosis records only small and infrequent tubercles anteriorly and posteriorly and their strength and degree of development always appears to be of a lesser order than in our Chinese material. Because variation is such ornamentation may be caused by ecological conditions, the effects of which are not yet fully understood in *Cypridea*, we have here chosen to assign subspecific rather than full specific status; the two are clearly very closely related, however.

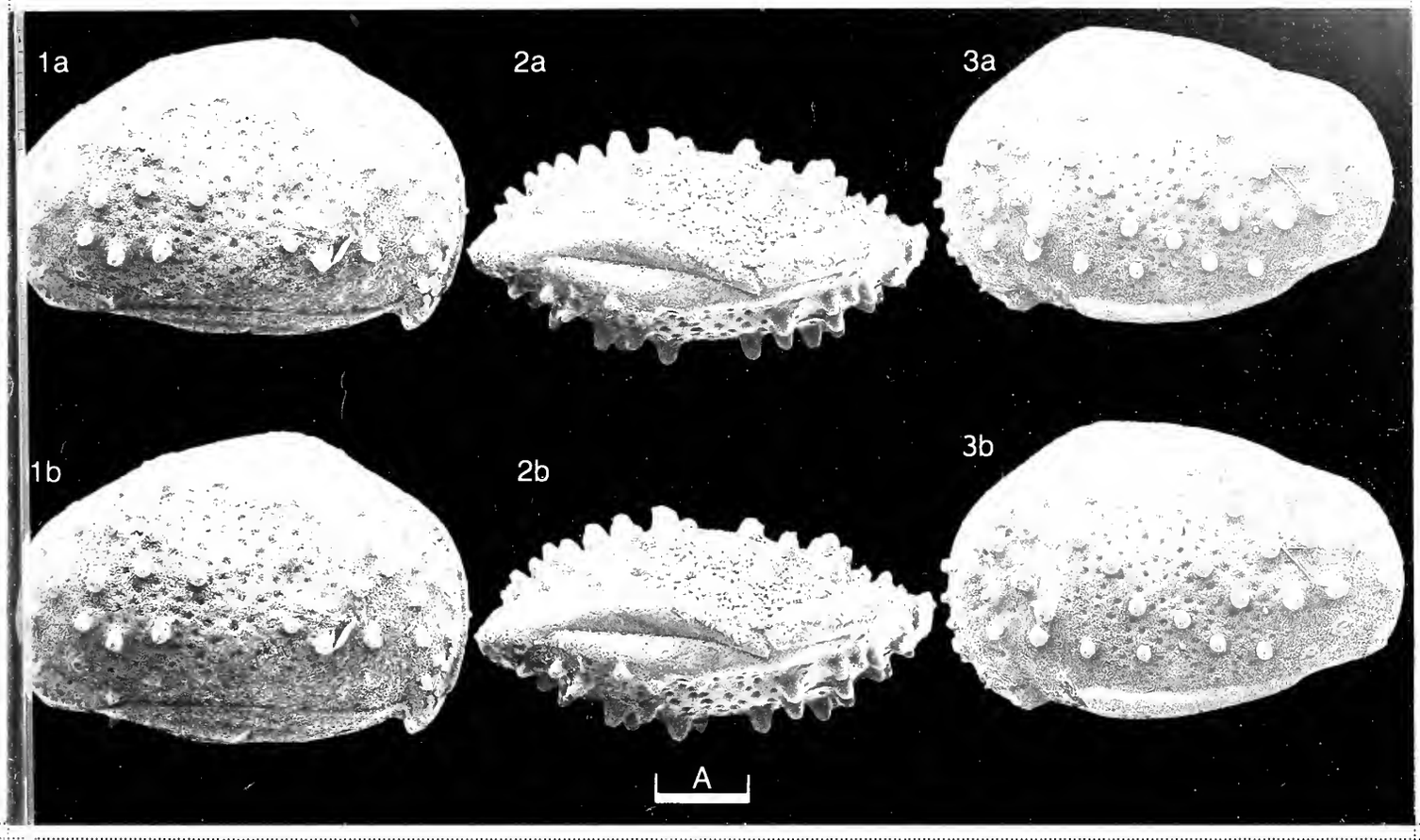
Distribution: *C. unicostata chinensis* is found in the Jingchuan Formation (upper part of the Zhidan Group), Shanganning Basin, NW China. It is regarded as Hauterivian-Barremian and its associated fauna includes *C. wujiamiaonensis* Su *et al.* (1980, *op. cit.*).

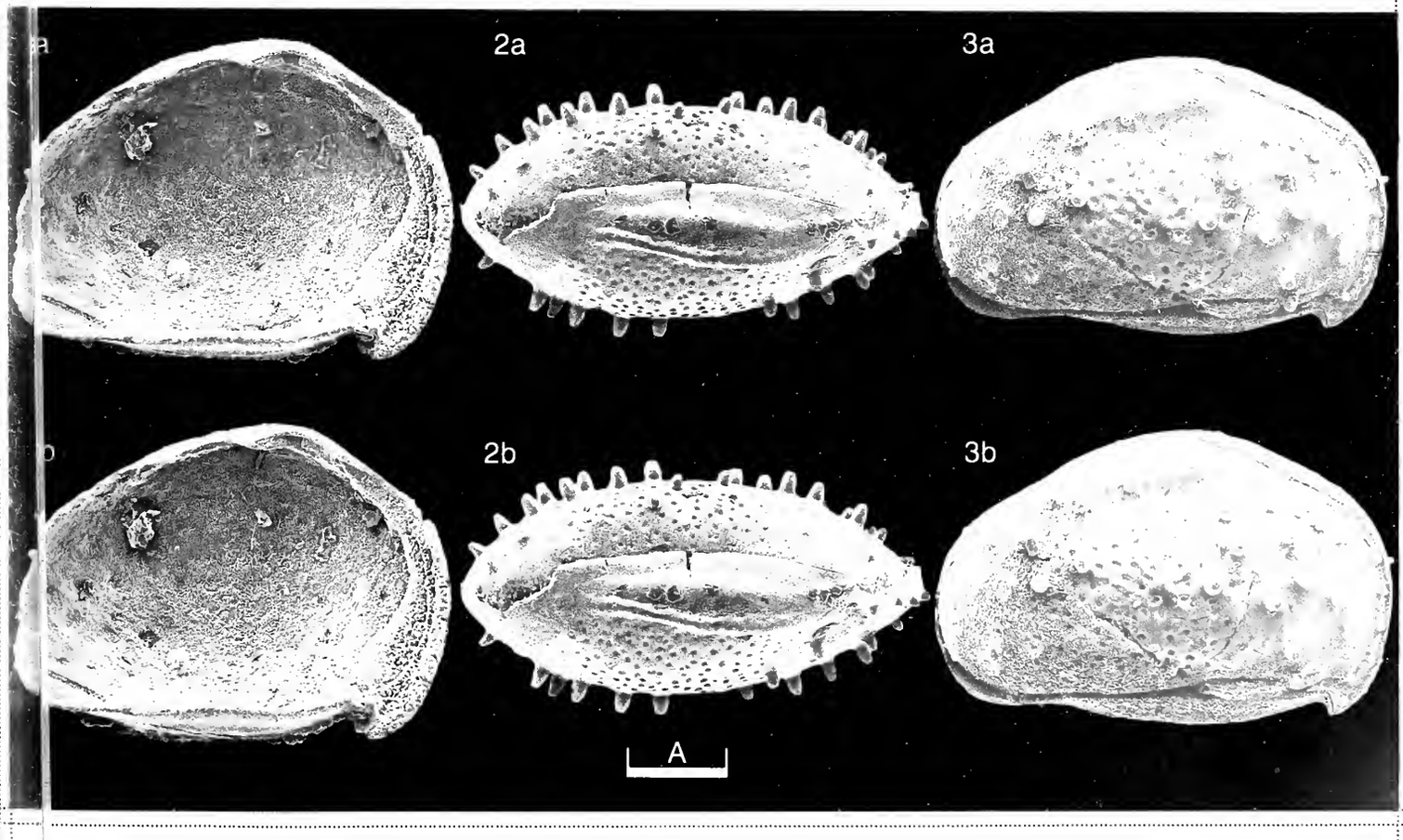
Acknowledgement: We wish to express our thanks to the K. C. Wong Foundation which kindly provided a Royal Society Fellowship for Dr Su to study in Hull.

Explanation of Plate 17, 22

Fig. 1, LV, int. lat. (**10.3**, 935 μm long); fig. 2, car., ext. vent. (**10.6**, 950 μm long); fig. 3, car., ext. rt. lat. (**10.5**, 890 μm long).

Scale A (200 μm; ×70), figs. 1–3.


1a
2a
3a
1b
2b
3b
A


2a
3a
2b
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A

Stereo-Atlas of Ostracod Shells 17 (6) 23–30 (**1990**)
595.337.12 (116.312/313) (510 : 161.125.44) : 551.312

ON *SUNLIAVIA TUMIDA* SOU

by Su Deying & John W. Neale
(Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China & University of Hull, England)

Genus *SUNLIAVIA* Sou, 1959

Type-species (original designation): *Sunliavia tumida* Sou, 1959

1959 *Sunliavia* gen. nov. Sou Zhixi, *in* M. A. Netchaeva, Liu Zhongyun, Su Deying, Sou Zhixi, Tian Guizhen & Tsao Lianbi, *Lower Cretaceous Ostracoda from the Songliao Basin*, Geol. Publ. House, Beijing, 48.

1974 *Sunliavia* Sou; Hao Yichun, Su Deying, Li Yougui, Ruan Peihua & Yang Fengtian, *Cretaceous-Tertiary Ostracoda from the Songliao Basin*, Geological Press, Beijing, 80.

Diagnosis: Carapace tumid, sub-triangular in shape, dorsal margin strongly arched, with strong over-reach of right valve over left, with this accentuated at cardinal angles. Internal details poorly known.

Remarks: Extensive dorsal over-reach of one valve by the other is seen in *Cyprinotus* Brady, 1886 (*J. Linn. Soc.*, **19**, 301) but here the right valve is the larger and the nature of the over-reach as well as the shape of the carapace is quite different. *Sunliavia* is closest to *Limnocypridea* Lubimova, 1956 (*in* Mandelstam *et al.*, *Trudy vses. nauchno-issled. geol. Inst.*, n.s., **12**, 106), from the Early Cretaceous Dzunbainsk Formation of Mongolia. In the latter the left valve also strongly overlaps the right but the overlap along the anterior and posterior margins is more pronounced, the valves

Explanation of Plate 17, 24

Figs. 1–3, ♂ car. (holotype, **184**, 1145 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors.; fig. 3, ext. lt. lat.
Scale A (200 μm; ×57), figs. 1–3.

are subrectangular with a relatively straight dorsal margin, and in dorsal view the carapace is much less tumid. *Sunliavia*, in contrast, shows a much more arched margin in the right valve with consequent accentuation of over-reach by the left valve at the cardinal angles, the shell is more rounded-triangular than subrectangular in side view and is far broader proportionally in dorsal view. Lubimova (*op. cit.*) placed *Limnocypridea* in the Cyprididae, subfamily Cyprideinae, and it is here that we are placing *Sunliavia* until further information, particularly concerning its internal features, becomes known.

Sunliavia tumida Sou, 1959

1959 *Sunliavia tumida* sp. nov. Sou Zhixi, *in* M. A. Netchaeva, Liu Zhongyun, Su Deying, Sou Zhixi, Tian Guizhen & Tsao Lianbi, *Lower Cretaceous Ostracoda from the Songliao Basin*, Beijing, 48, pl. 15, figs. 4a–d.

1974 *Sunliavia tumida* Sou; Hao Yichun, Su Deying, Li Yougui, Ruan Peihua & Yang Fengtian, *Cretaceous-Tertiary Ostracoda from the Songliao Basin*, Beijing, 80, pl. 30, figs. 1a–e.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, no. **184**; ♂ carapace.

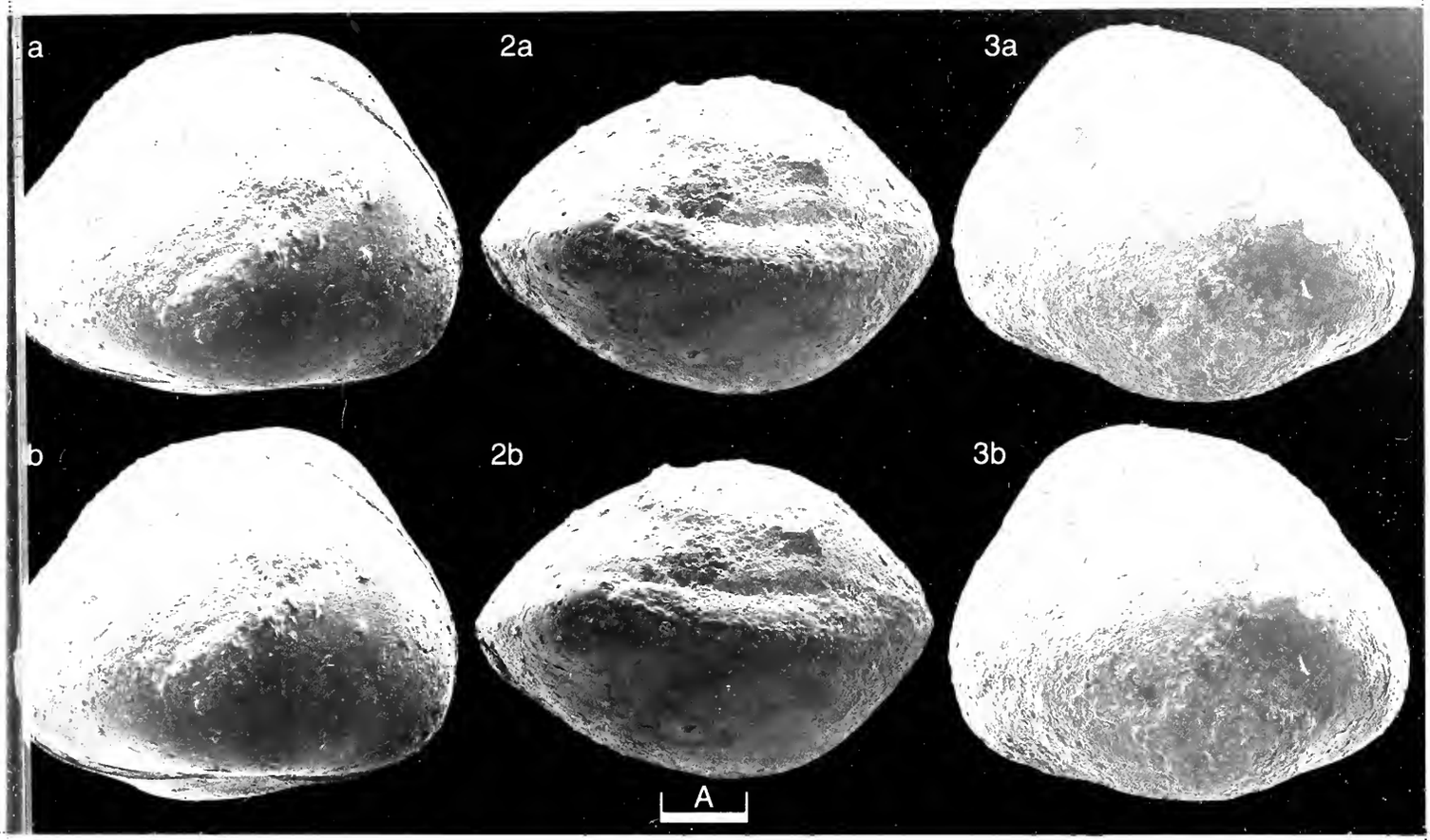
Type locality: Yaojia Formation, Dekhoi (lat. 44°31′N, long. 125°40′E), Songliao Basin, China (see Text-fig. 1); Aptian/Albian.

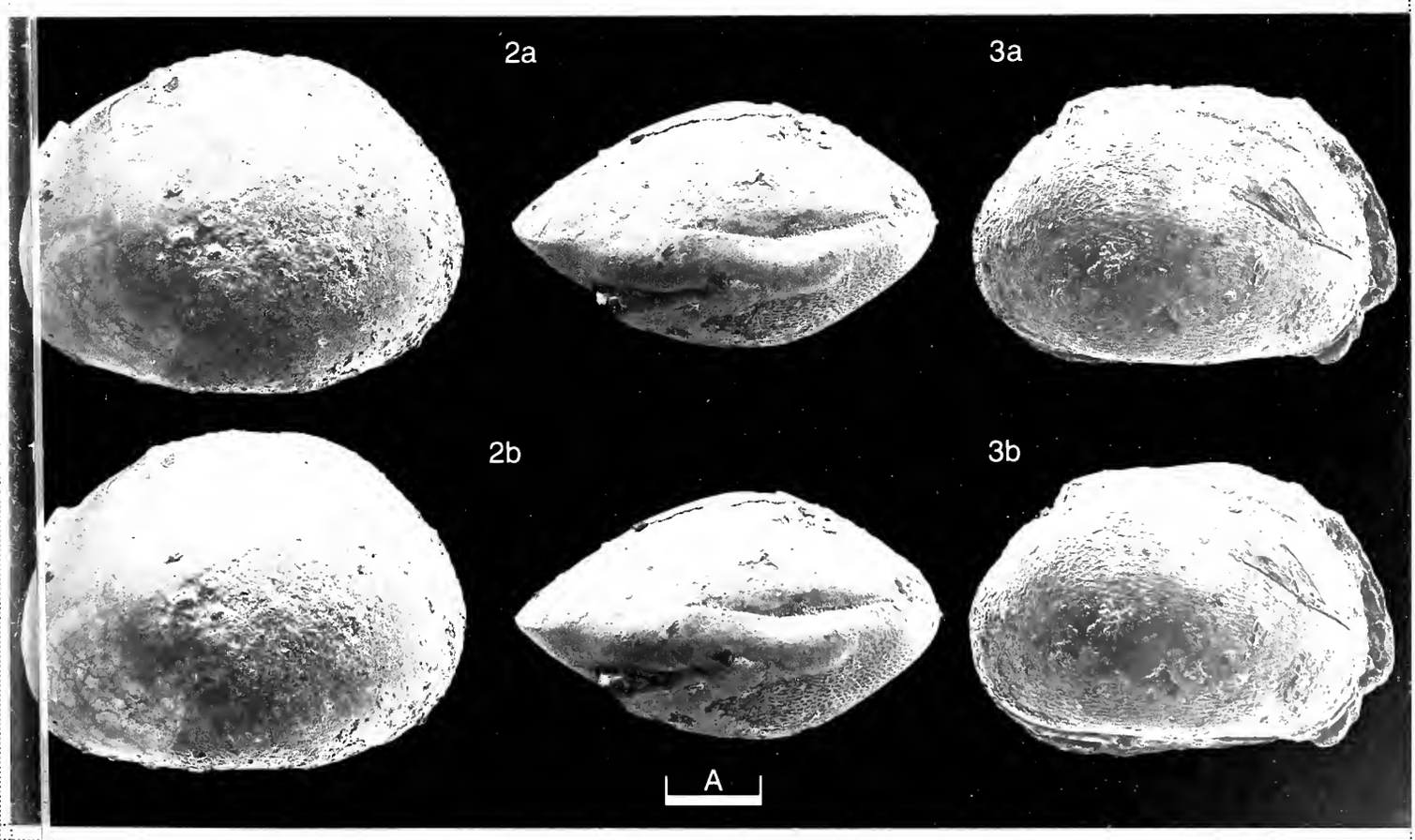
Figured specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, nos. **184** (holotype, ♂ car.: Pl. **17**, 24, figs 1–3), **10.33** (♀ car.: Pl. **17**, 26, fig. 1), **10.38** (♂ car. juv.: Pl. **17**, 26, fig. 2; Pl. **17**, 28, fig. 2), **10.39** (♀ car. juv.: Pl. **17**, 26, fig. 3; Pl. **17**, 30, fig. 3), **10.34** (♀ car.: Pl. **17**, 28, fig. 1; Pl. **17**, 30, fig. 1), **10.37** (♀ LV: Pl. **17**, 28, fig. 3; Pl. **17**, 30, fig. 2). All from the type locality and horizon.

Diagnosis: Carapace sub-triangular in lateral view, greatest height anteriorly or centrally, greatest length ventrally, dorsal margin strongly arched; in dorsal view, tumid. Left valve rather larger than right

Explanation of Plate 17, 26

Fig. 1, ♀ car., ext. lt. lat. (**10.33**, 1040 μm long); fig. 2, ♂ juv. car., ext. dors. (**10.38**, 950 μm long); fig. 3, ♀ juv. car., ext. rt. lat. (**10.39**, 950 μm long).
Scale A (200 μm; ×64), figs. 1–3.


a
2a
3a
b
2b
3b
A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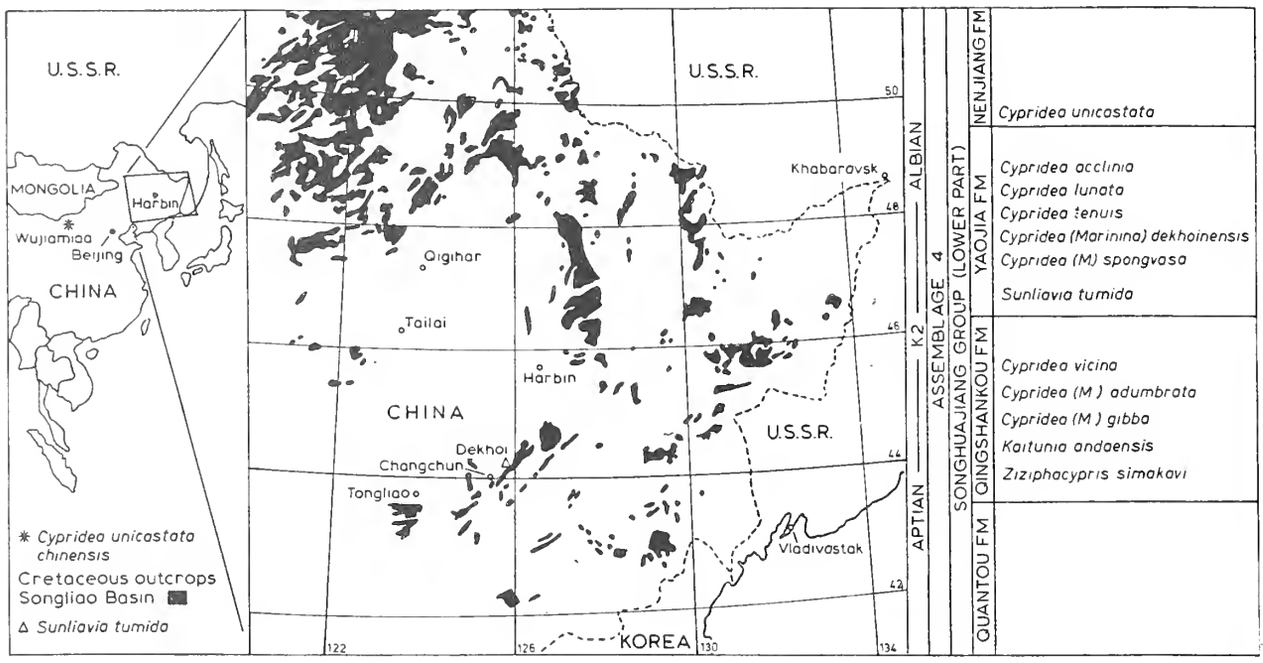


Text-fig. 1: Map and stratigraphic section showing, respectively, the type locality and horizon of *Sunliavia tumida*. Map also shows type locality of *Cypridea unicostata chinensis* (see J. W. Neale & Su Deying, *Sterero-Atlas Ostracod Shells*, **17**, 19–22, 1990).

Explanation of Plate 17, 28

Fig. 1, ♀ car., ext. rt. lat. (**10.34**, 1025 μm long); fig. 2, ♂ juv. car., ext. rt. lat. (**10.38**, 950 μm long); fig. 3. ♀ LV, ext. lat. (**10.37**, 1055 μm long). Scale A (200 μm; ×64), figs. 1–3.

valve, over-reach accentuated at dorsal cardinal angles. Adults large (>1mm), surface of valves with delicate reticulum.

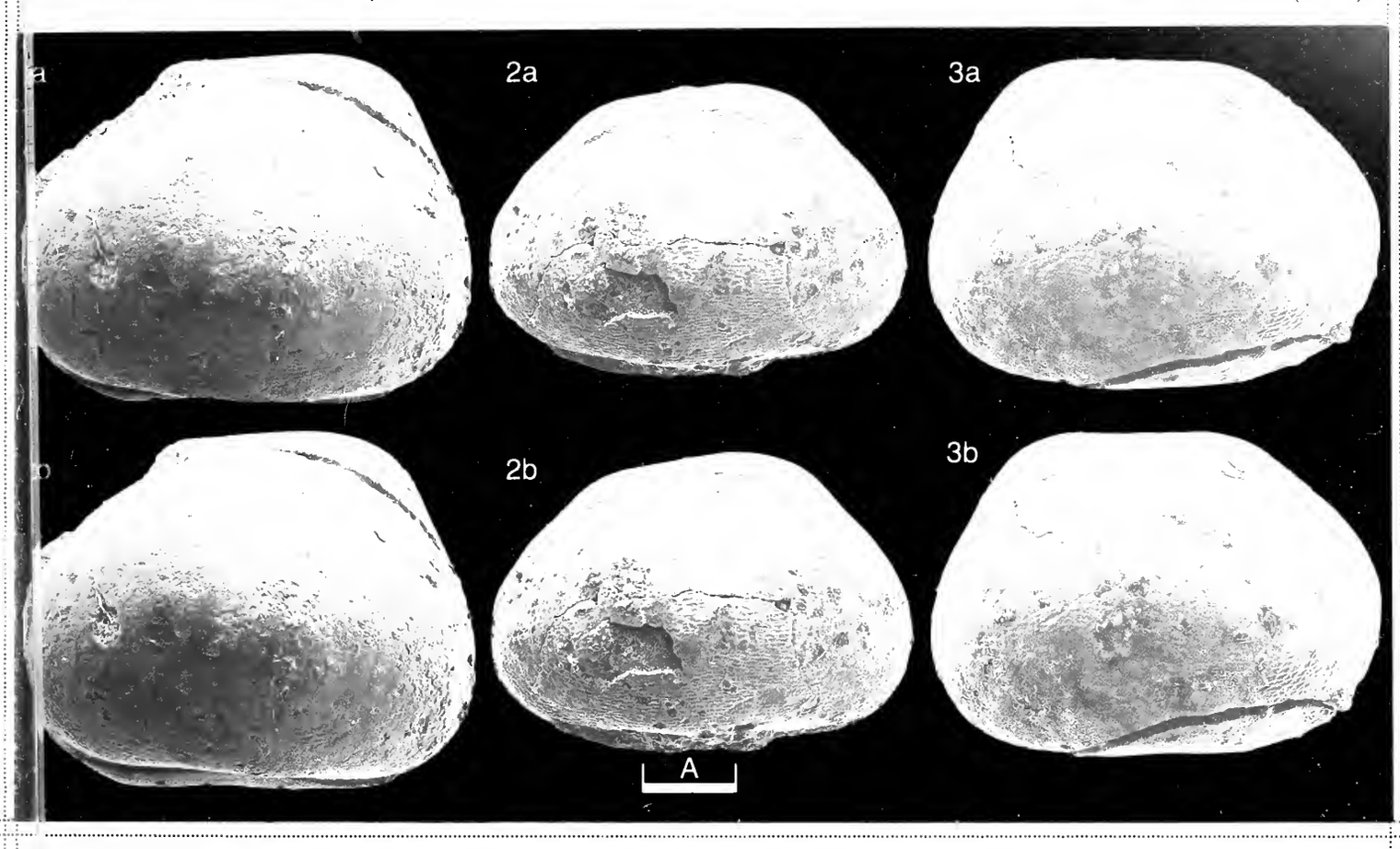
Remarks: The most obvious feature of this species is the very strong over-reach of the right valve by the left in the dorsal region (Pl. **17**, 24, fig. 1; Pl. **17**, 28, fig. 1) and the delicate reticulate ornament seen in well preserved specimens (Pl. **17**, 28, figs. 2, 3). The forms which are narrower posteriorly and have a ventral bulge are provisionally interpreted as males (Pl. **17**, 24, figs. 1–3), while the forms which maintain the height more posteriorly are regarded as females (Pl. **17**, 28, figs. 1, 3). The penultimate instars also appear to show this dimorphism, with presumed males (Pl. **17**, 28, fig. 2) and females (Pl. **17**, 26, fig. 3). All material is in the form of carapaces except for one single valve (Pl. **17**, 28, fig. 3; Pl. **17**, 30, fig. 2). Careful removal of the infilling material reveals that it contains five valves stacked one inside the other. The two larger ones are left valves of an adult and the penultimate instar, the three smaller ones are juvenile right valves. The adult valves show that the larger left valve accommodated the smaller right valve by means of a simple tongue and groove arrangement all around the shell with some expansion of the groove at the extremities of the dorsal margin. The smaller right valves, with the positive elements, show this expansion clearly in the form of simple elongate tooth plates. Unfortunately it has not been possible to determine the nature of the muscle scar pattern. Some possible traces are seen in Pl. **17**, 28, fig. 2 but are indistinct.

Distribution: Yaojia Formation, lower part of the Songhuajiang Group (Aptian/Albian), Songliao Basin (see Text-fig. 1), associated with *Cypridea acclinia*, *C.* (*M*). *dekhoinensis*, *C. tenuis*, *C. lunata* and *Ziziphocypris simakovi* which form part of Assemblage 4 of the Mesozoic non-marine Ostracoda of China (see Hao Yichun *et al.*, 1974, *op. cit.*).

Acknowledgement: We wish to express our thanks to the W. C. Wong Foundation who kindly provided a Royal Society Fellowship for Dr Su to study in Hull.

Explanation of Plate 17, 30

Fig. 1, ♀ car., ext. dors. (**10.34**, 1025 μm long); fig. 2, ♀ LV, int. lat. (**10.37**, 1055 μm long); fig. 3, ♀ juv. car., ext. vent. (**10.39**, 950 μm long). Scale A (200 μm; ×64), figs. 1–3.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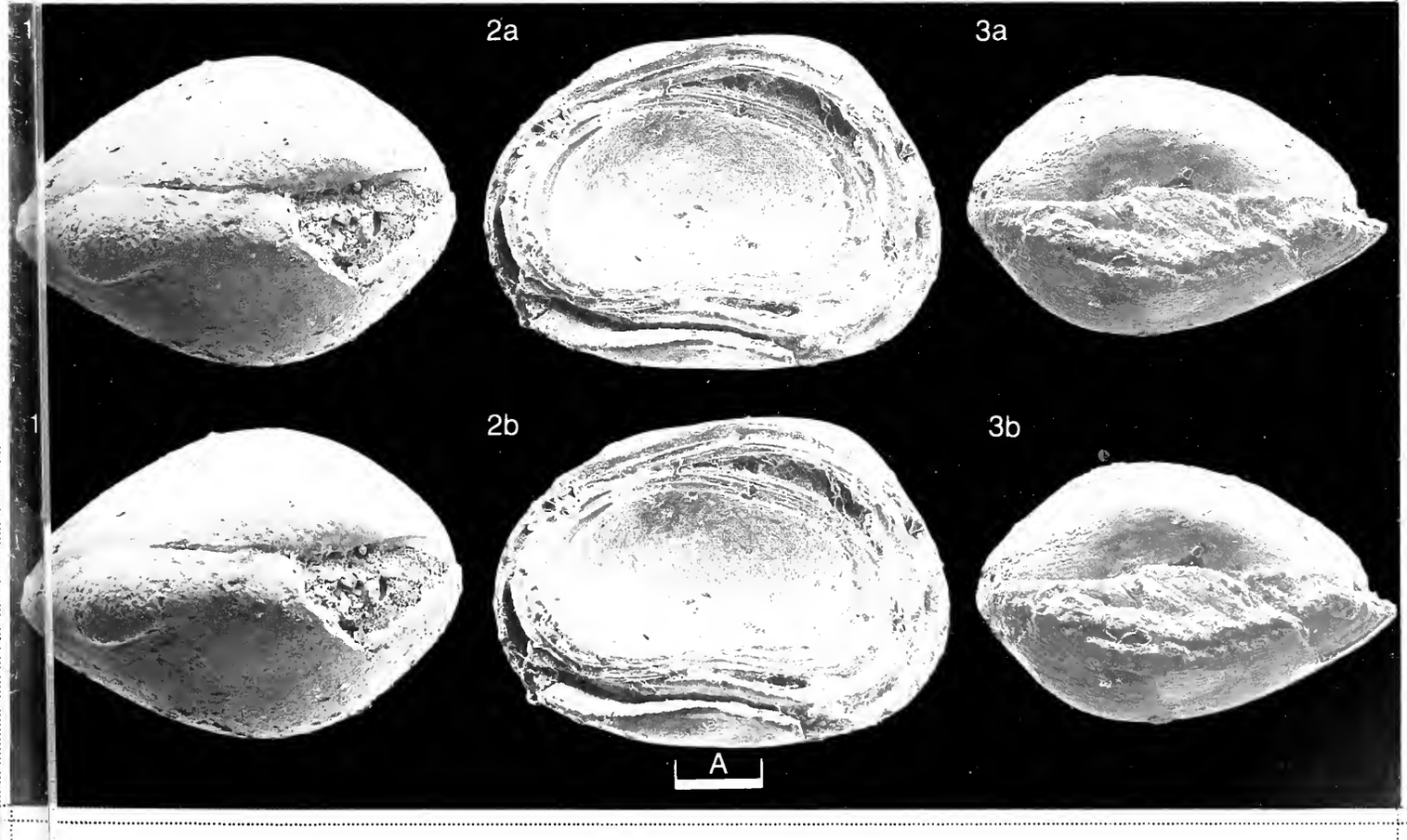
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595.337.14 (116.222) (411 : 162.007.57) : 551.312 + 552.52

ON *THERIOSYNOECUM CONOPIUM* WAKEFIELD & ATHERSUCH sp. nov.

by Matthew I. Wakefield & John Athersuch
(University of Leicester & BP Research Centre, Sunbury, England)

Theriosynoecum conopium sp. nov.

Holotype: British Museum (Nat. Hist.), no. **OS 13463**; ♂ carapace.
[Paratypes: British Museum (Nat. Hist.), nos. **OS 13464 – OS 13470** and **OS 13478**.]

Type locality: Top 5 cm, Bed 7, of J. E. Andrews (*J. geol. Soc. Lond.*, **142**, 1119–1137, 1985); Kilmaluag Formation, Great Estuarine Group, middle Jurassic, Port Gobhlaig, Kilmaluag Bay, Trotternish, Skye, Scotland. National Grid Reference: NG 436 751; lat. 57° 42′ N, long. 6° 19′ W.

Derivation of name: Latin *conopium*; with reference to the net-like ornament.

Figured specimens: British Museum (Nat. Hist.), nos. **OS 13463** (holotype, ♂ car.: Pl. **17**, 32, figs. 1–7.), **OS 13464** (paratype, ♀ car.: Pl. **17**, 34, figs. 1, 3, 5, 7), **OS 13465** (paratype, ♀ car.: Pl. **17**, 34, figs. 2, 4, 6, 8), **OS 13466** (paratype, A–1, car.: Pl. **17**, 36, figs. 1–4), **OS 13467** (paratype, A–2, car.: Pl. **17**, 38, figs. 1, 2), **OS 13468** (paratype, A–1 LV: **17**, 38, figs. 3, 4), **OS 13469** (paratype, A–1, RV: Pl. **17**, 38, figs. 5, 6), **OS 13470** (paratype, ♀ car.: Pl. **17**, 38, figs. 7, 8), **OS 13478** (paratype, A–1, RV: Pl. **17**, 36, figs. 5, 6). **OS 13467**, **OS 13469** and **OS 13478** are from Bed 1, Kilmaluag Formation at the type locality (see Andrews, 1985, *op. cit.*) **OS 13468** is from Bed 7 of Andrews (*Aspects of Sedimentary Facies and Diagenesis in Limestone-Shale Formations of the Middle Jurassic Great Esturaine Group, Inner Hebrides*, Unpubl. PhD Thesis, University of Leicester,

Explanation of Plate 17, 32

Fig. 1, ♂ car., ant. (holotype, **OS 13463**, 1218 μm long); fig. 2, ♂ car., post. (**OS 13463**); fig. 3, ♂ car., ext. lat. (**OS 13463**); fig. 4, ♂ car., ext. lat. (**OS 13463**); fig. 5, ♂ car., dors. (**OS 13463**); fig. 6, ♂ car., vent. (**OS 13463**); fig. 7, ♂ car., ornament (**OS 13463**).
Scale A (200 μm; ×38), figs. 1–6; scale B (100 μm; ×120), fig. 7.

1984), Duntulm formation, Great Estuarine Group at Duntulm Bay, Trotternish, Skye. The other specimens are from the type locality and horizon.

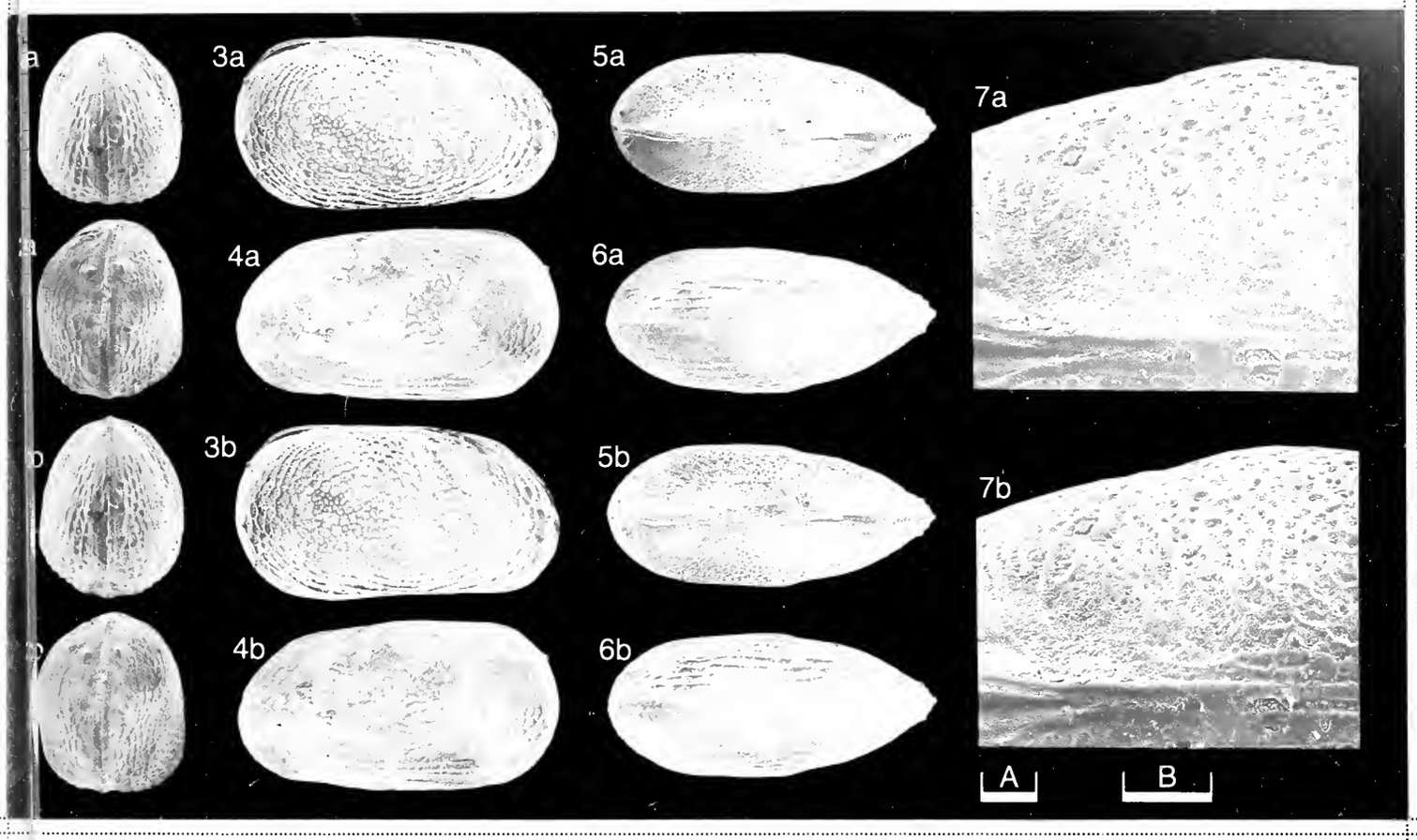
Diagnosis: Elongate species of *Theriosynoecum*. Long slightly convex dorsum with prominent posterior cardinal angle. Ventral surface centrally concave at commisure. Shell surface strongly reticulate, second order reticulation well developed. Ventral ridges continue both anteriorly and posteriorly resulting in a prominant, concentrically parallel and marginally positioned ridge pattern. Up to eight hollow tubercles and at least five other pore conuli may be developed in juveniles, only the anterior and posterior pore conuli are developed in the adults. Narrow inner lamella with slight overhang.

Remarks: Colin & Danielopol (*Paléobiol. contin.*, **1**, 1–51, 16 pls., 1980) considered that *Theriosynoecum* and *Bisulcocypris* are synonomous. Based on the respective type-species we concur with that conclusion. However, it is possible that some species referred to *Bisulcocypris* may belong outside *Theriosynoecum*. From an examination of published illustrations and type material we conclude that there is a general (generic) pattern of tubercles, but that the relative positions in different species vary. Note the variation in the shape of the triangular net of pores/tubercles immediately posterior of the sulci (Text-figs. 6, 7).

The two species closest in appearance to *T. conopium* are *Theriosynoecum anglica* (Bate) and *Theriosynoecum ancasterensis* (Bate) (see R. H. Bate, *Bull. Br. Mus. nat. Hist.* (Geol.), **14**, 29–33, 1967). *T. conopium* differs from *T. anglica* in having a more evenly rounded posterior in the female whilst the male is more elongate. *T. conopium* differs from *T. ancasterensis* in having a more evenly rounded posterior in the female. The latter has a coarser reticulation but lacks the distinctive parallel marginal ridges posteriorly. The type-species (by original designation), *Morrisonia wyomingensis* Branson, 1935 (see P. C. Sylvester-Bradley, *Stereo-Atlas Ostrcod Shells*,

Explanation of Plate 17, 34

Fig. 1, ♀ car., ant. (paratype, **OS 13464**, 1045 μm long); fig. 2, ♀ car., post. (paratype, **OS 13465**, 1082 μm long); fig. 3, ♀ car., ext. lat. (**OS 13464**); fig. 4, ♀ car., ext. lat. (**OS 13465**); fig. 5, ♀ car., vent. (**OS 13464**); fig. 6, ♀ car., dors. (**OS 13465**); fig. 7, ♀ car., vent. oranment (**OS 13464**); fig. 8, ♀ car., dors. ornament (**OS 13465**).
Scale A (200 μm; ×44), figs. 1, 3, 5; scale B (200 μm; ×43), figs. 2, 4, 6; scale C (50 μm; ×200), fig. 7; scale D (100 μm; ×140), fig. 8.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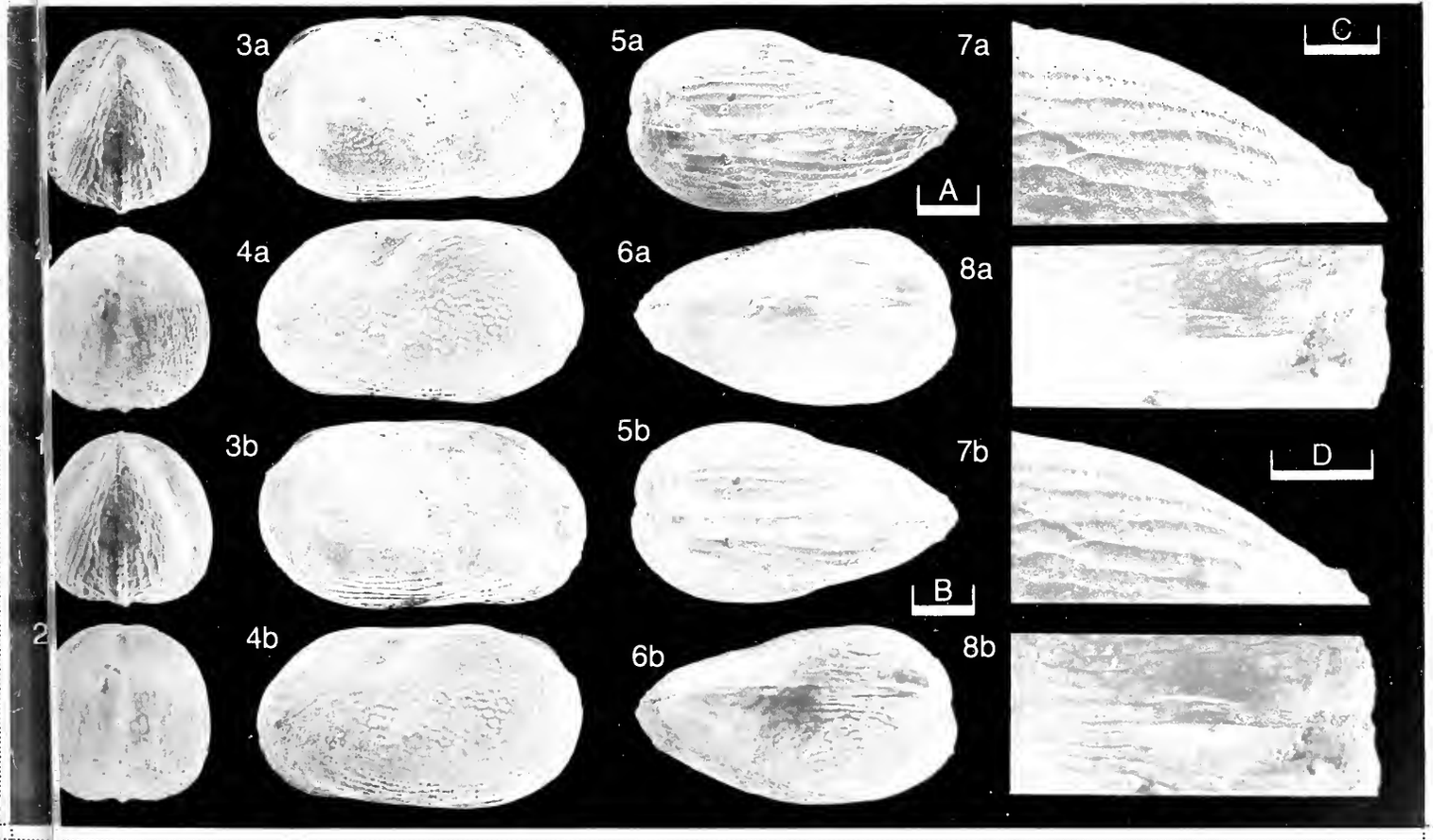
B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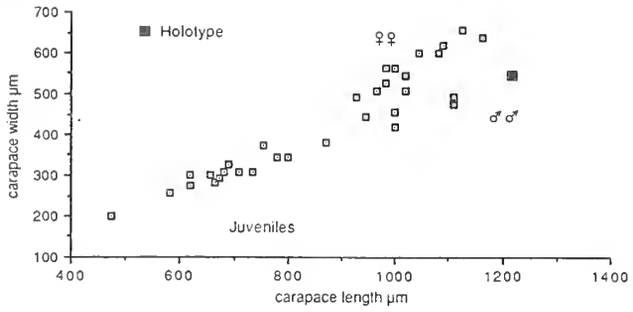
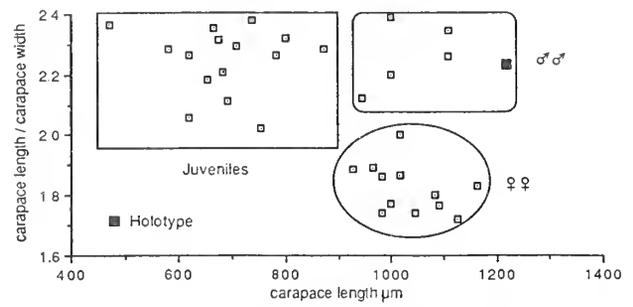
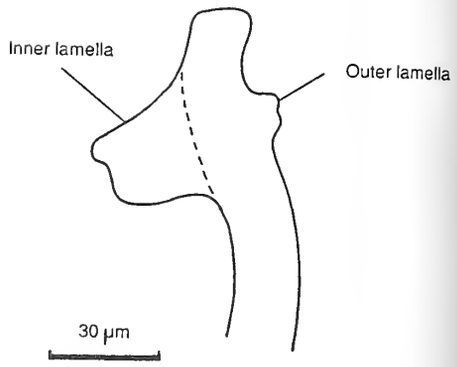
6b
8b



Text-fig. 1. Ontogeny of a topotype populations of *T. conopium*, showing sexual dimorphism.



Text-fig. 2. Sexual dimorphism of a topotype population of *T. conopium*.



Text-fig. 3. Section of posterior marigin of *T. conopium*, ♀ LV.

Explanation of Plate 17, 36

Fig. 1, A–1 car., ext. lat. (paratype, **OS 13466**, 709 µm long); fig. 2, A–1 car., dors. (**OS 13466**); fig. 3, A–1 car., tubercle (**OS 13466**); fig. 4, A–1 car., anterior margin pore conuli (**OS 13466**); fig. 5, A–1 RV, int. lat. (**OS 13478**, 700 µm long); fig. 6, A–1, oblique int. ant. (**OS 13478**).

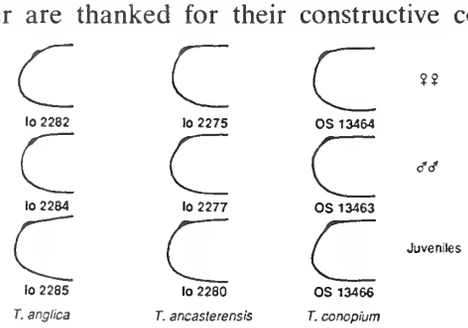
Scale A (100 µm; × 65), figs. 1, 2; scale B (10 µm; × 650), fig. 3; scale C (10 µm; × 550), fig. 4; scale D (100 µm; × 74), fig. 5; scale E (100 µm; × 90), fig. 6.

1, 205–212, 1973), differs from *T. conopium* in having a strong longitudinal ridge ventro-laterally. The muscle scars are typical of the genus (Text-fig. 5).

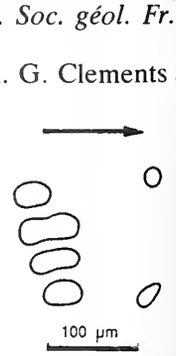
Distribution: Known only from the Duntulm and Kimaluag formations, Great Estuarine Group, Trotternish, Skye; Laig Gorge, Eigg; and Camas Mor, Muck, Scotland.

A presumed low salinity species found in association with *Darwinula* and an undescribed species of conchostracan (J. D. Hudson pers. comm.). The Kilmaluag Formation has been intepreted as having been deposited in shallow, freshwater lagoons (Andrews, 1985). Ostracod valves in the lagoons were constantly agitated by shoreline waves resulting in imbricate stacks (cup in cup) of several instars; of the type described by Guernet & Lethiers (*Bull. Soc. géol. Fr.*, **8**, 557–588, 1989).

Acknowledgement: M. I. Wakefield thanks NERC and BP for CASE studentship support. Drs. R. G. Clements and David J. Siveter are thanked for their constructive comments.



Text-fig. 4. Differences in posterior outline of the named *Theriosynoecum* species. (British Museum (Nat. Hist.) collection numbers).

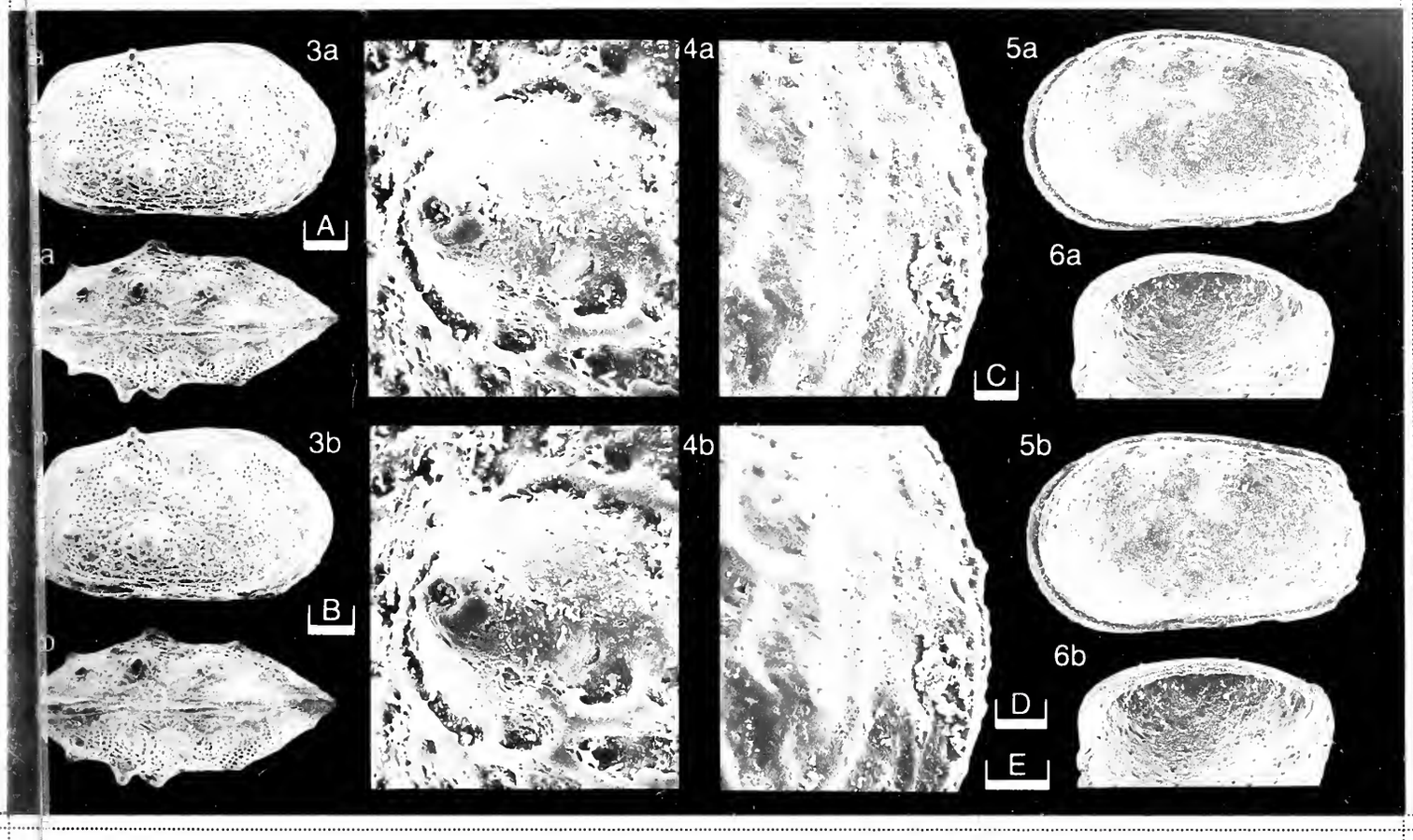


Text-fig. 5. Muscle scars of *T. conopium* ♀ LV.

Explanation of Plate 17, 38

Fig. 1, A–2 car., ext. lat. (paratype, **OS 13467**, 655 µm long); fig. 2, A–2 car., ornament and sieve pores (**OS 13467**); fig. 3, A–1 LV, int. lat. "cup-in-cup" valves (paratype, **OS 13468**, 909 µm long); fig. 4, A–1 LV, int. lat. hinge (**OS 13468**); fig. 5, A–1 RV, ext. lat. (paratype, **OS 13469**, 709 µm long); fig. 6, ♀ car., ext. lat. (paratype, **OS 13470**, 1127 µm long); fig. 7, ♀ car., post. cardinal angle (**OS 13470**).

Scale A (100 µm; × 70), fig. 1; scale B (10 µm; × 500), fig. 2; scale C (100 µm; × 50), fig. 3; scale D (50 µm; × 115), fig. 4; scale E (100 µm; × 65), fig. 5; scale F (200 µm; × 40), fig. 6; scale G (50 µm; × 160), fig. 7.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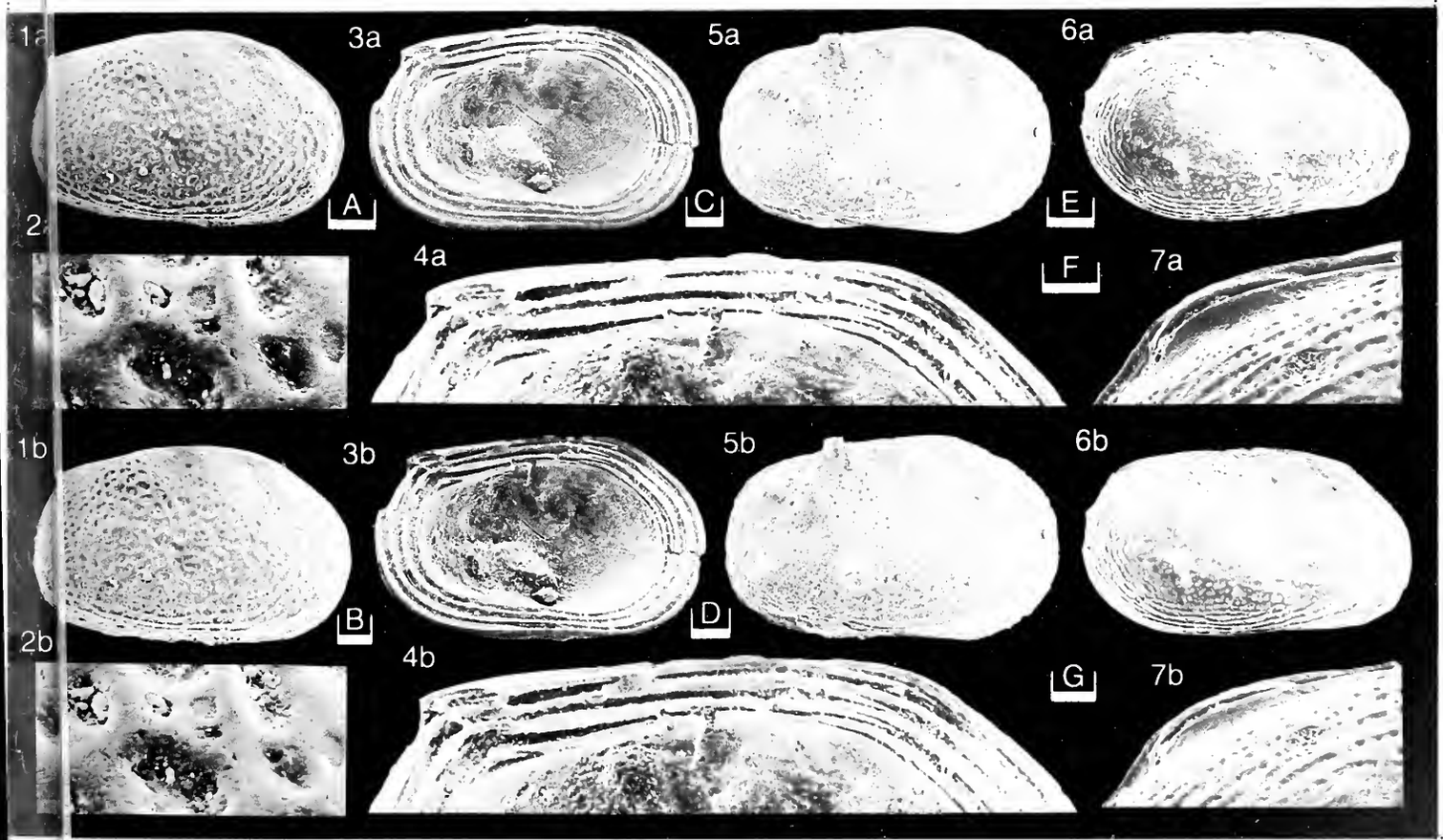
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4b
7b

595.337.11 (116.222) (411 : 162.006.57 + 420.162.001.53) : 551.312.4 + 552.52

ON *DARWINULA INCURVA* BATE

by Matthew I. Wakefield
(University of Leicester, England)

Darwinula incurva Bate, 1967

1965 *Darwinula* sp. A; R. H. Bate, *Palaeontology*, **8**, 751, pl. 109, figs. 1–4.
1967 *Darwinula incurva* sp. nov. R. H. Bate, *Bull. Br. Mus. nat. Hist.* (Geol.), **14**, 28–29, pl. 1, figs. 7–12.

Holotype: British Museum (Nat. Hist.), no. **Io 2259**; carapace.
[Paratypes: nos. **Io 2260–74**.]

Type locality: Admix Refractories Clay Pit, King's Cliffe, Northamptonshire, England; National Grid Reference: TL 012,966; lat. 52° 38′ N, long. 0° 31′ W. Bed 7 (of P. C. Sylvester-Bradley, D. F. Merriam & C. J. Aslin, *Geol. Ass. Guide, Uppingham Area*, University of Leicester, **27**, 1968),Upper Estuarine Series, Bathonian, middle Jurassic.

Figured specimens: British Museum (Nat. Hist.), nos. **Io 2259** (holotype, car.: Pl. **17**, 42, figs. 3, 4), **Io 2262** (paratype, RV: Pl. **17**, 44, fig. 3), **OS 13461** (LV: Pl. **17**, 42, figs. 1, 2), **OS 13460** (RV: Pl. **17**, 42, figs. 5, 6), **OS 13462** (RV: Pl. **17**, 44, fig. 1) and **OS 13459** (car.: Pl. **17**, 44, fig. 2). **Io 2259** and **Io 2262** are from the type locality. **OS 13459–OS 13462** are from the middle Jurassic, Great Estuarine Group, Laig Gorge, Eigg, lat. 6° 08′ W, long. 56° 55′ N. **OS 13459** is from the top 5 cm of Bed 1, Kilmaluag Formation. **OS 13460** and **OS 13461** are from 20 cm above the base of Bed 21, Duntulm formation.

Explanation of Plate 17, 42

Fig. 1, LV, ext. lat. (**OS 13461**, 836 μm long); fig. 2, LV, vent. (**OS 13461**); fig. 3, car. ext. lat. (holotype, **Io 2259**, 1009 μm long); fig. 4, car. vent. (**Io 2259**); fig. 5, RV, ext. lat. (**OS 13460**, 818 μm long); fig. 6, RV, vent. (**OS 13460**).
Scale A (200 μm; ×73), figs. 1, 2, 5, 6; scale B (200 μm; ×60), figs. 3, 4.

OS 13462 is from 65 cm above the base of Bed 5, Kilmaluag Formation of J. E. Andrews (*Aspects of Sedimentary Facies and Diagenesis in Limestone – Shale Formations of the Middle Jurassic Great Estuarine Group, Inner Hebrides*, Unpubl. PhD Thesis, University of Leicester, 1984).

Diagnosis: *Darwinula* with convex dorsum and ventral inflexure anterior to mid-line. Left valve larger than and overlapping right valve, with maximum overlap at ventral inflexure. Adductor muscle-scar rosette has 11 segments.

Remarks: The adductor muscle-scar of *D. incurva* occurs immediately above the ventral inflexure and is moderately variable. Occasionally only 10 segments are present in the muscle-scar; however, the basal segment clearly shows a dividing line which in other specimens results in the occurrence of the more typical 11 segment muscle-scar morphology. Further sub-divisions are observed in the 2 segments immediately anterior to the basal segments (Pl. **17**, 44, figs. 1–3).

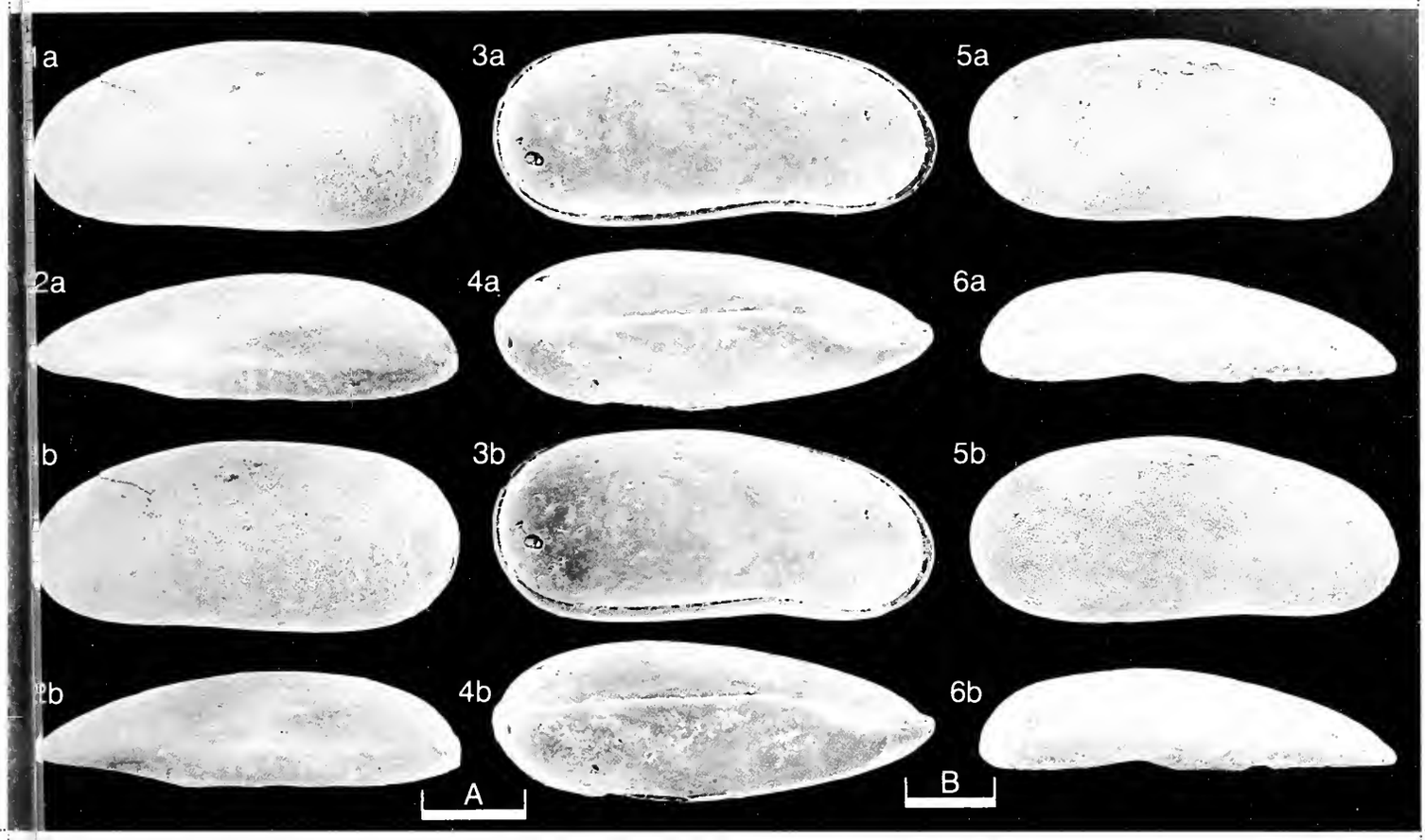
D. incurva is similar to *Darwinula tubiformis* Ljubimova (P. S. Ljubimova, *Trudy vses. neft. nauchno-issled. geol.-razv. Inst.*, n.s., **93**, 119, 120, 1956) but is less inflated posteriorly, the LV ventral overlap is more prominent and the inflexure is closer to the anterior margin.

Distribution: A freshwater species, found in association with the ostracods of the genus *Theriosynoecum*. Found in the Upper Estuarine Series, King's Cliffe, Northamptonshire, England and the Duntulm and Kilmaluag formations, Great Estuarine Group, Eigg, Scotland (Wakefield in prep.).

Acknowledgement: NERC & BP for CASE studentship support and David J. Siveter for helpful comments.

Explanation of Plate 17, 44

Fig. 1, damaged car. showing int. mould of muscle-scar of RV (**OS 13462**, 836 μm long); fig. 2, RV, int. mould of muscle-scar (**OS 13459**, 764 μm long); fig. 3, RV, int. muscle-scar (**Io 2262**, damaged valve).
Scale A (50 μm; ×395), figs. 1–3.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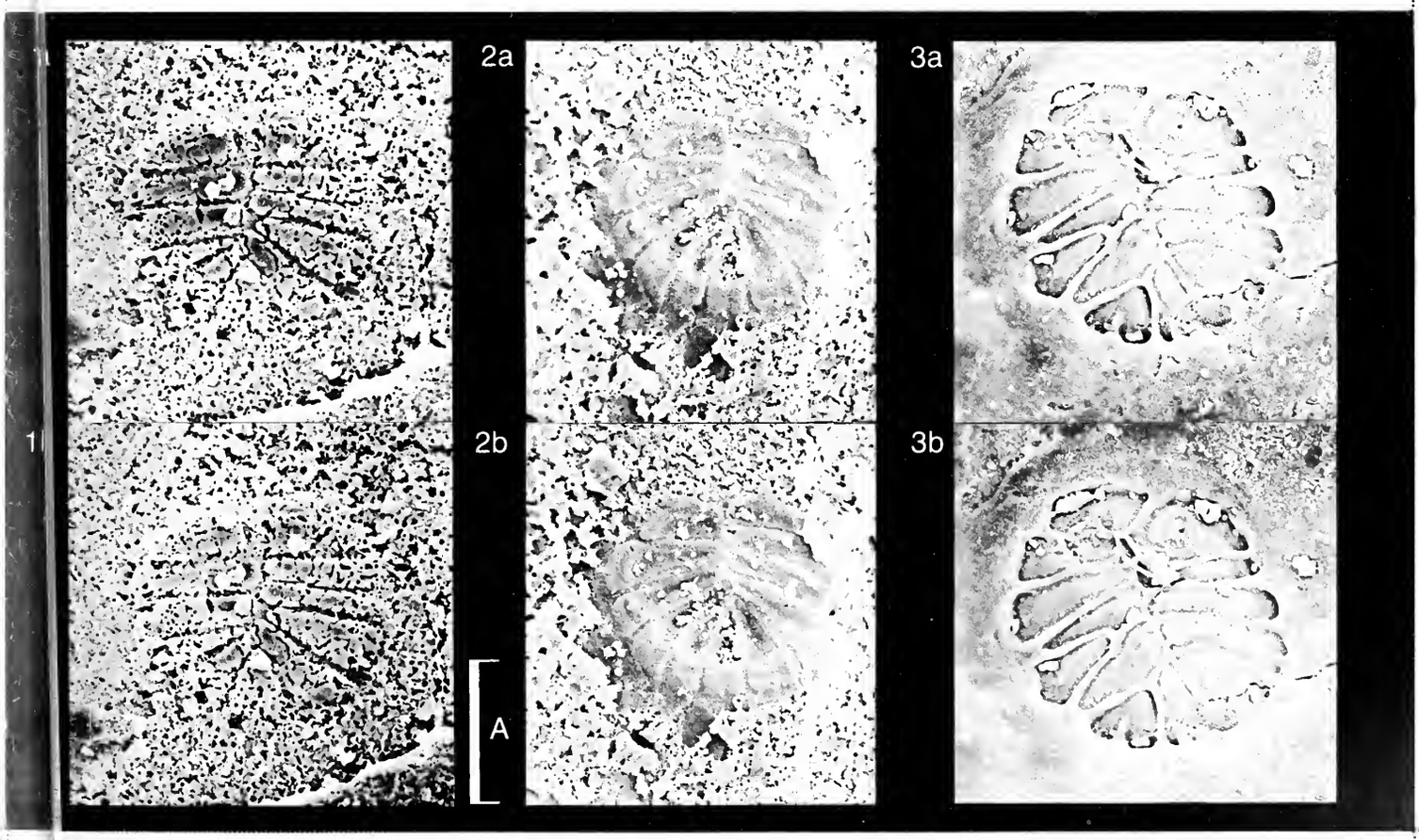
B


2a
3a
2b
3b
A

336.11 (113.333) (430.2 : 161.013.54 + 014.54 + 438 : 161.015.54 + 485) : 551.351 + 552.54

ON *LONDINIA KIESOWI* (KRAUSE)

by Wolfgang Hansch & David J. Siveter
(University of Greifswald, German Democratic Republic & University of Leicester, England)

Londinia kiesowi (Krause, 1891)

1891 *Kloedenia kiesowi* sp. nov. A. Krause, *Z. dt. geol. Ges.*, **43** (2), 506–507, 518–519, pl. 32, figs. 12, 13.
1963 *Londinia kiesowi* (Krause); A. Martinsson, *Bull. geol. Instn Univ. Uppsala*, **42**, 1, 20–24, 28, figs. 7A, 9, 10, 13B.
1977 *Londinia kiesowi* (Krause); A. Martinsson, *The Silurian-Devonian Boundary, IUGS Series A*, no. 5, 46, 328.
1986 *Londinia kiesowi* (Krause); R. E. L. Schallreuter, *Mitt. geol.-paläont. Inst. Univ. Hamburg*, **61**, 200–201, pl. 2, fig. 1, pl. 6, fig. 8a (q.v. for full synonymy).
1989 *Londonia kiesowi* (Krause); D. J. Siveter, *in*: M. G. Bassett & C. H. Holland (Eds.), *A global standard for the Silurian System*, 263, fig. 168H, *Nat. Mus. Wales, Geol. Series*, no. 9, Cardiff.

Lectotype: Museum für Naturkunde Berlin, German Democratic Republic (GDR), no. **M.B.O. 143**; ♀ LV. Krause, 1891, pl. 32, fig. 13; Martinsson, 1963, 22, fig. 10A.
[Paratypes: Museum für Naturkunde Berlin, **M.B.O. 144**, tecnomorphic LV; Krause, 1891, pl. 32, fig. 12 and Martinsson, 1963, 22, fig. 10B. **M.B.O. 145**, ♀ RV; Martinsson, 1963, 19, fig. 7A, 28, fig. 13B. British Museum (Nat. Hist.), **I 6022**, ♀ RV.]
Type locality: Erratic boulder no. 549 of Krause, 1891. From 'Klein-Horst', Poland, lat. 54°6′N, long. 15°4.5′E.

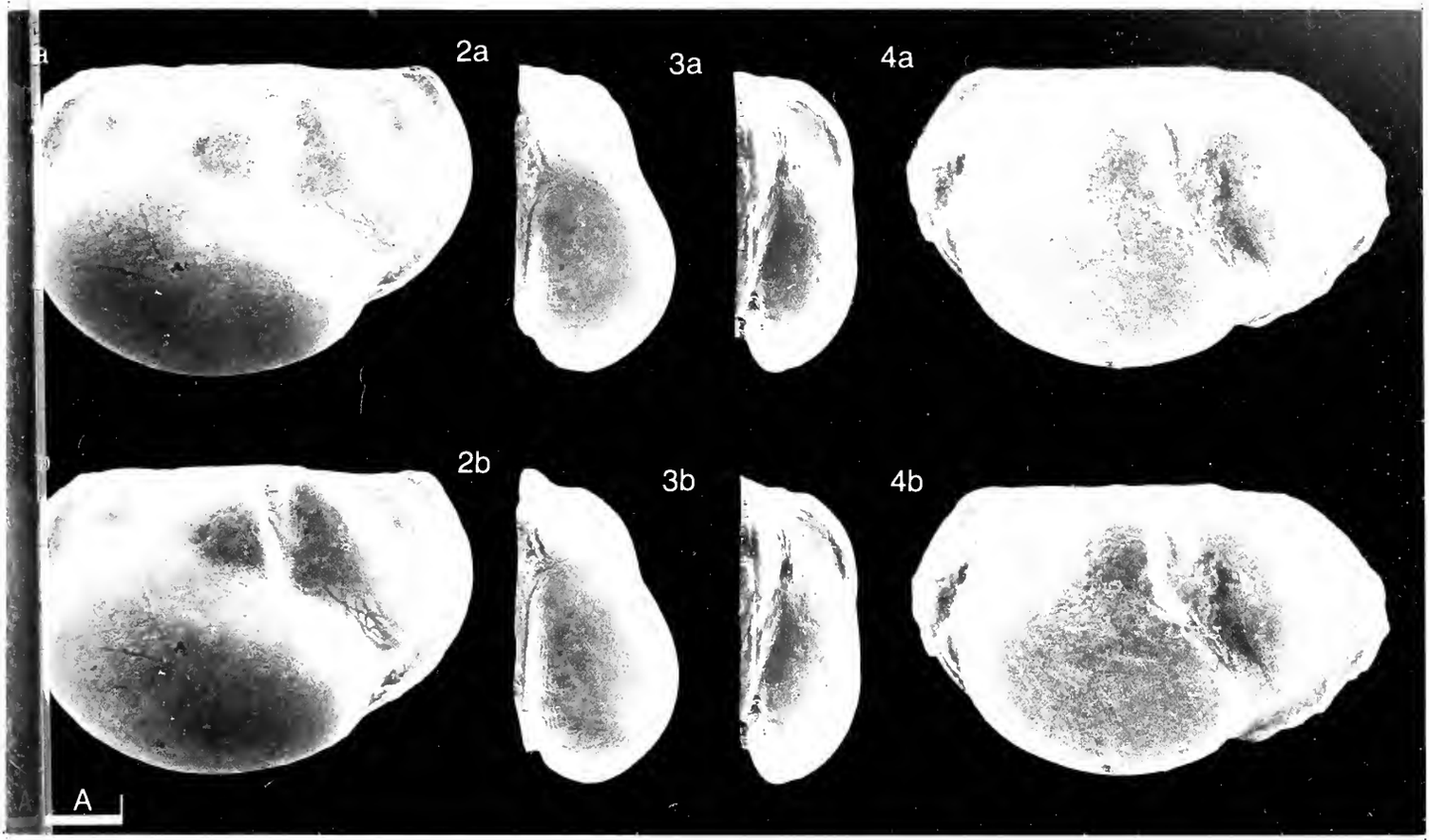
Explanation of Plate 17, 46

Figs. 1, 2, ♀ LV (**SGWG 83/13**, 2880 μm long); fig. 1, ext. lat.; fig. 2, ext. ant. Figs. 3, 4, ♀ LV (**SGWG 83/14**, 2930 μm long): fig. 3, ext. ant.; fig. 4, ext. lat.
Scale A (500 μm; ×23), figs. 1–4.

Figured specimens: Sektion Geologische Wissenschaften der E.-M.-Arndt-Universität Greifswald (SGWG), GDR, nos. **SGWG 83/13** (♀ LV: Pl. **17**, 46, figs. 1, 2; Pl. **17**, 48, fig. 6) and **SGWG 83/15** (♂ RV: Pl. **17**, 48, figs. 1–3), from erratic boulder no. Bey. A15, Koserow, Isle of Usedom, GDR; lat. 54°03′N, long. 14°0′E. **SGWG 83/14** (♀ LV: Pl. **17**, 46, figs. 3, 4; Pl. **17**, 48, figs. 4, 5), **SGWG 83/17** (♀ LV: Pl. **17**, 50, figs. 4, 5, 7), **SGWG 83/18** (♀ LV: Pl. **17**, 50, fig. 6) and **SGWG 83/19** (♀ RV: Pl. **17**, 52, figs. 6, 7), from erratic boulder no. Bey. D54, Gager, Isle of Ruegen, GDR; approx. lat. 54°17′N, long. 13°45′E. **SGWG 83/16** (♂ LV: Pl. **17**, 48, fig. 7; Pl. **17**, 50, figs. 1–3), from erratic boulder no. Bey. D49, Gager, Isle of Ruegen, GDR. British Museum (Nat. Hist.), no. **I 6022** (♀ RV: Pl. **17**, 52, figs. 1–3), from erratic boulder no. 549 of Krause (1891, *op. cit.*). Paleont. Mus. Univ. Lund, no. **LO 2182t** (♀ LV: Pl. **17**, 52, figs. 4, 5; figured J. C. Moberg & K. A. Grönwall, *Acta Univ. lund.*, N.F., **5** (1), pl. 4, fig. 17, 1909), from (Öved-Ramsåsa) bed 4 of Moberg & Grönwall (1909, *op. cit.*; = Oved Sandstone Formation, Öved-Ramsåsa Group, of Jeppsson & Laufeld, *Sver. geol. Unders. Afn.*, Ser. Ca, **58**, 1987), Scåne, S Sweden. All specimens are from the Přidoli Series, Silurian.
Diagnosis: *Londinia* species with symmetrically arranged lobes on both sides of the adductorial sulcus which hardly, if at all, protrude over the dorsal margin. Generally lobes do not show distinct lateral surface facets or reticulation except on the cuspidal part of the preadductorial lobe and anterior lobule of the syllobium. Adductorial sulcus does not reach below valve mid-height.
Remarks: A detailed description of *L. kiesowi* based on the original erratic boulder material from Krause (1891, *op cit.*) was given by Martinsson (1963, *op. cit.*). Our investigations of material from the Leba 1 borehole in the Peribaltic area of Poland (see Martinsson, *Geol. För. Stockh. Förh.*, **86**, (2), 138, figs. 7A–C, 1964), erratic boulder material from the T. R. Jones collection (British Museum (Nat. Hist.)), London, the figured types of Moberg & Grönwall (1909, 64–66 *pars*, 81,

Explanation of Plate 17, 48

Figs. 1–3, ♂ RV (**SGWG 83/15**, 2730 μm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, ext. ant. Figs. 4, 5, ♀ LV (**SGWG 83/14**): fig. 4, ext. vent.; fig. 5, detail of cuspidal parts of preadductorial lobe and ant. syllobial lobule. Fig. 6, ♀ LV, detail of cuspidal parts of preadductorial lobe and ant. syllobial lobule (**SGWG 83/13**). Fig. 7, ♂ LV, ext. post. (**SGWG 83/16**, 3080 μm long).
Scale A (500 μm; ×23), figs. 1–4; scale B (215 μm; ×40), figs. 5, 6; scale C (375 μm; ×24), fig. 7.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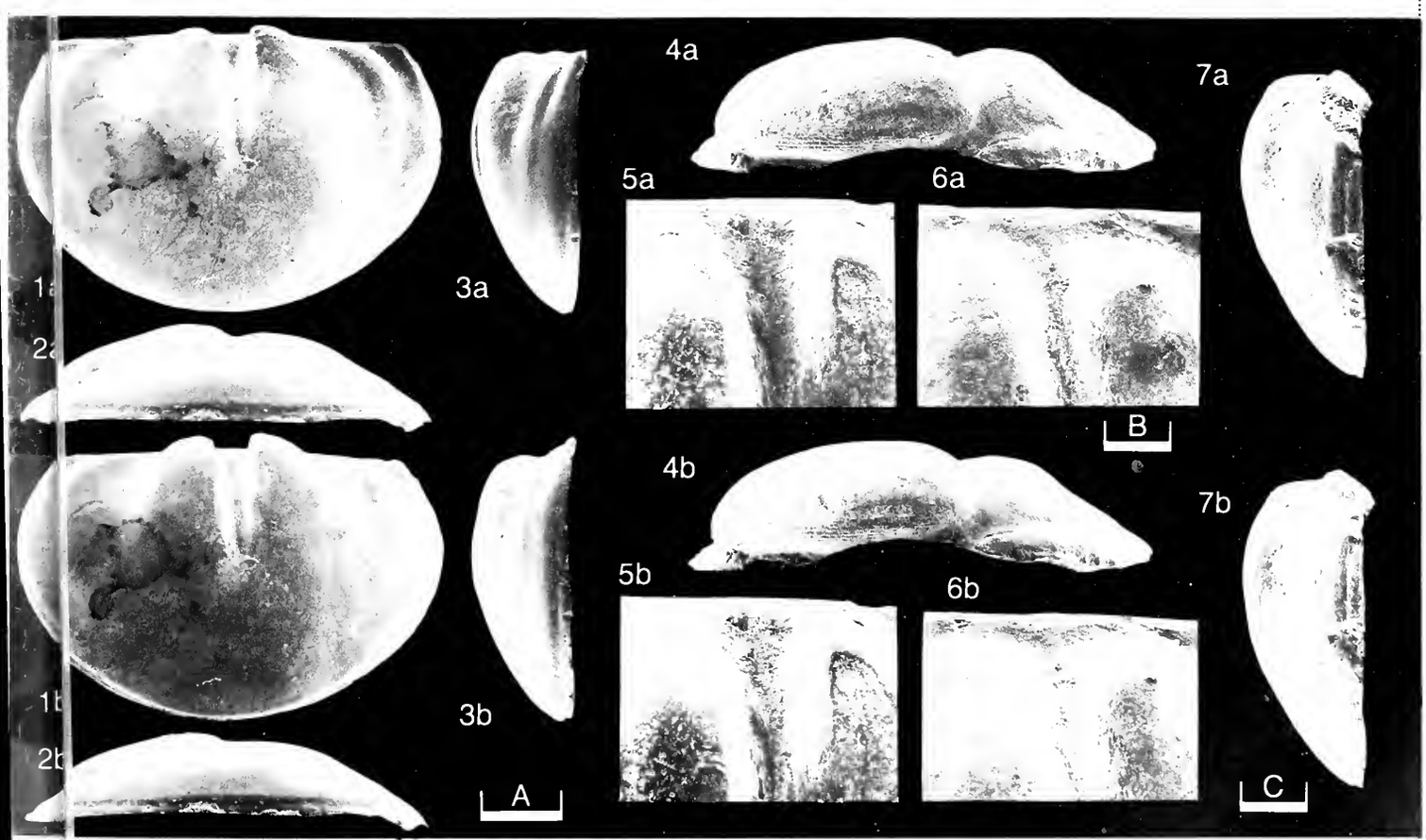
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86, pl. 4, figs. 16, 17; cf. Martinsson, 1963, 23–24) and newly collected Baltic erratic boulder specimens indicate a bigger morphological variability of this species than that noted by Martinsson (1963, *op. cit.*).

Variation affects especially the shape and the size of the crumina, the nature of the cuspidal part of the two main lobes, and the morphology of the adductorial sulcus. The crumina extends either from a point almost vertically below the anterior end of the valve or the anterior limit of the anterior lobe to about the centre of the anterior lobule of the syllobium. The width of the subcruminal fingerprint-like striation and the distinctness of the dorsal delimination of the crumina from the domicilial part of the valve varies with cruminal size. In some specimens the preadductorial lobe and the anterior lobule of the syllobium are higher and show well developed cuspidal facets. In such specimens a fine, dorsal, striate or sometimes reticulate lobal field is visible and is bounded by two weakly swollen bends as in other kloedeniine species such as *Klodenia leptosoma* Martinsson, 1963. Such specimens also display a syllobial anterior lobule which is less angular dorsally than its equivalent preadductorial lobe (cf. Pl. **17**, 50, figs. 6, 7). In tecnomorphs differences in lobal faceting and ornament are less pronounced than in females. The adductorial sulcus becomes deeper and longer during ontogeny. One heteromorphic (♀) valve found together with other 'typical' specimens of *L. kiesowi* shows an extremely indistinct lobal and cruminal development (cf. Pl. **17**, 52, figs. 6, 7). Unfortunately there is no more material available but probably it is currently necessary to regard it as an extreme variant.

L. kiesowi differs from the type-species of *Londinia* (*L. reticulifera* Martinsson, 1963) mainly by its shorter adductorial sulcus in adult specimens, by the lack of lobal reticulation and by the limitation of the lobes to generally below the dorsal margin. Martinsson (1963, 26–28, *op. cit.*) mentioned that the typical features of *L. reticulifera* become obvious only in the last moult stage. For this reason a species assignment of *Londinia* specimens based only on tecnomorphic specimens

Explanation of Plate 17, 50

Figs. 1–3, ♂ LV (**SGWG 83/16**): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, detail of cuspidal part of preadductorial lobe. Figs. 4, 5, 7, ♀ LV (**SGWG 83/17**, approx. 2900 μm long): fig. 4, ext. lat.; fig. 5, detail of ventral side of crumina; fig. 7, detail of cuspidal part of preadductorial lobe. Fig. 6, ♀ LV, detail of cuspidal part of ant. syllobial lobule (**SGWG 83/18**, 3090 μm long).
Scale A (500 μm; ×20), figs. 1, 2, 4; scale B (40 μm; ×240), fig. 3; scale C (150 μm; ×60), fig. 5; scale D (100 μm; ×90), figs. 6, 7.

is difficult. The taxonomic position of the *Londinia* tecnomorphs occurring together with *Poloniella (Hoia) hieroglyphica* (Krause, 1891) (Schallreuter, 1986, *op. cit.*) is, therefore uncertain. However, if that association should be confirmed by finds of adults of *L. kiesowi*, together with well preserved *P. (H.) hieroglyphica* specimens, the latter species would not be suitable as an index species for the upper most ostracode association of the East Baltic area (cf. L. Sarv *in*: D. Kaljo & E. Klaamann (Eds.), *Ecostratigraphy of the East Baltic Silurian*, 77–78, Tallinn (Valgus), 1982).

Martinsson (*Geol. För. Stockh. Förh.*, **89**, 379, 1967) considered that *L. kiesowi* is conspecific with *L. arisaigensis* Copeland (*Bull. geol. Surv. Can.*, **117**, 1964) from Nova Scotia, Canada. However, particularly the shape and size of the lobes seem to be different between these species (cf. Schallreuter, 1986, *op. cit.*). Nevertheless, it is obvious that these species are closely related and because of their limited stratigraphic distribution at the base of the Přidoli Series they are, like *Frostiella groenvalliana* Martinsson, 1963, important species for regional correlation between Canada, Great Britain and the Baltic area at that horizon (cf. Martinsson, 1977; Siveter, 1989, *op. cit.*). It is also possible that the British species described under *Londinia* by R. W. L. Shaw (*Geol. För. Stockh. Förh.*, **91**, 1969) may hide conspecific material, but this requires further study.

Distribution: Late Silurian (Přidoli Series), Baltascandia region.

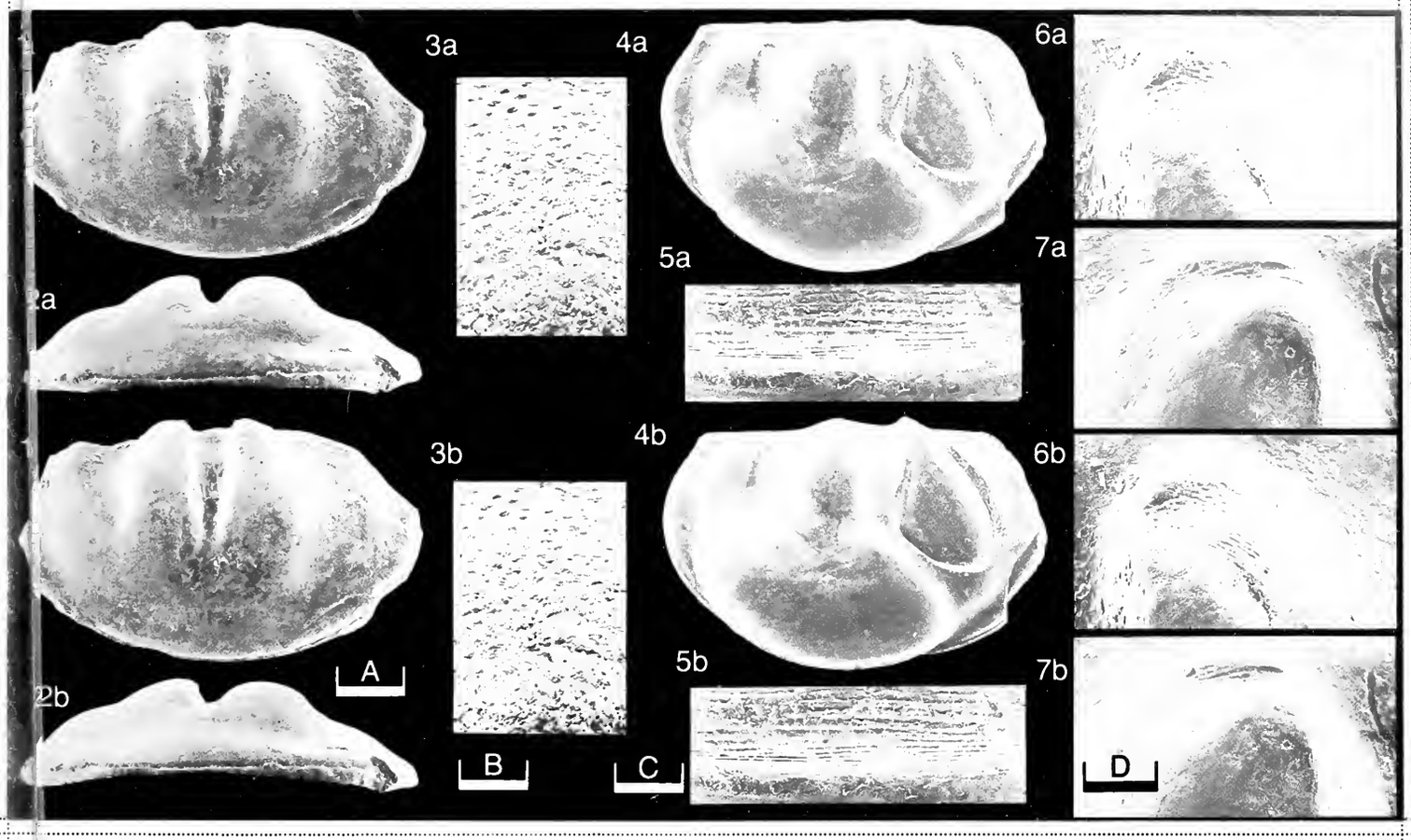
Sweden: Scania, Upper Öved-Ramsasa Beds 3–4 *sensu* Martinsson (1967, *op. cit.*).

Peribaltic area of Poland: Łeba 1 borehole, 'intermediate fauna', 686.15 m – 703.60 m (Martinsson, 1964, *op. cit.*); Łeba 2 borehole, post-Ludlow, *Neobeyrichia incerta* Zone (B. Zbikowska, *Acta geol. pol.*, **23**, 628–629, tab. 2, 1973).

Erratic boulders, Beyrichienkalk type B and 'Red Beyrichienkalk' *sensu* W. Hansch (*Lethaia*, **18**, 274, tab. 1, 1985); erratic boulder no. Sy58, Isle of Sylt (Schallreuter, 1986, *op. cit.*).

Explanation of Plate 17, 52

Figs. 1–3, ♀ RV (paratype, **I 6022**, 2700 μm long): fig. 1, ext. post.; fig. 2, ext. lat.; fig. 3, ext. vent. Figs. 4, 5, ♀ LV (**LO 2182t**, 2560 μm long): fig. 4, ext. lat.; fig. 5, ext. vent. Figs. 6, 7, ♀ RV (**SGWG 83/19**, 2580 μm long): fig. 6, ext. lat.; fig. 7, ext. vent.
Scale A (375 μm; ×24), fig. 1; scale B (500 μm; ×21), figs. 2–7.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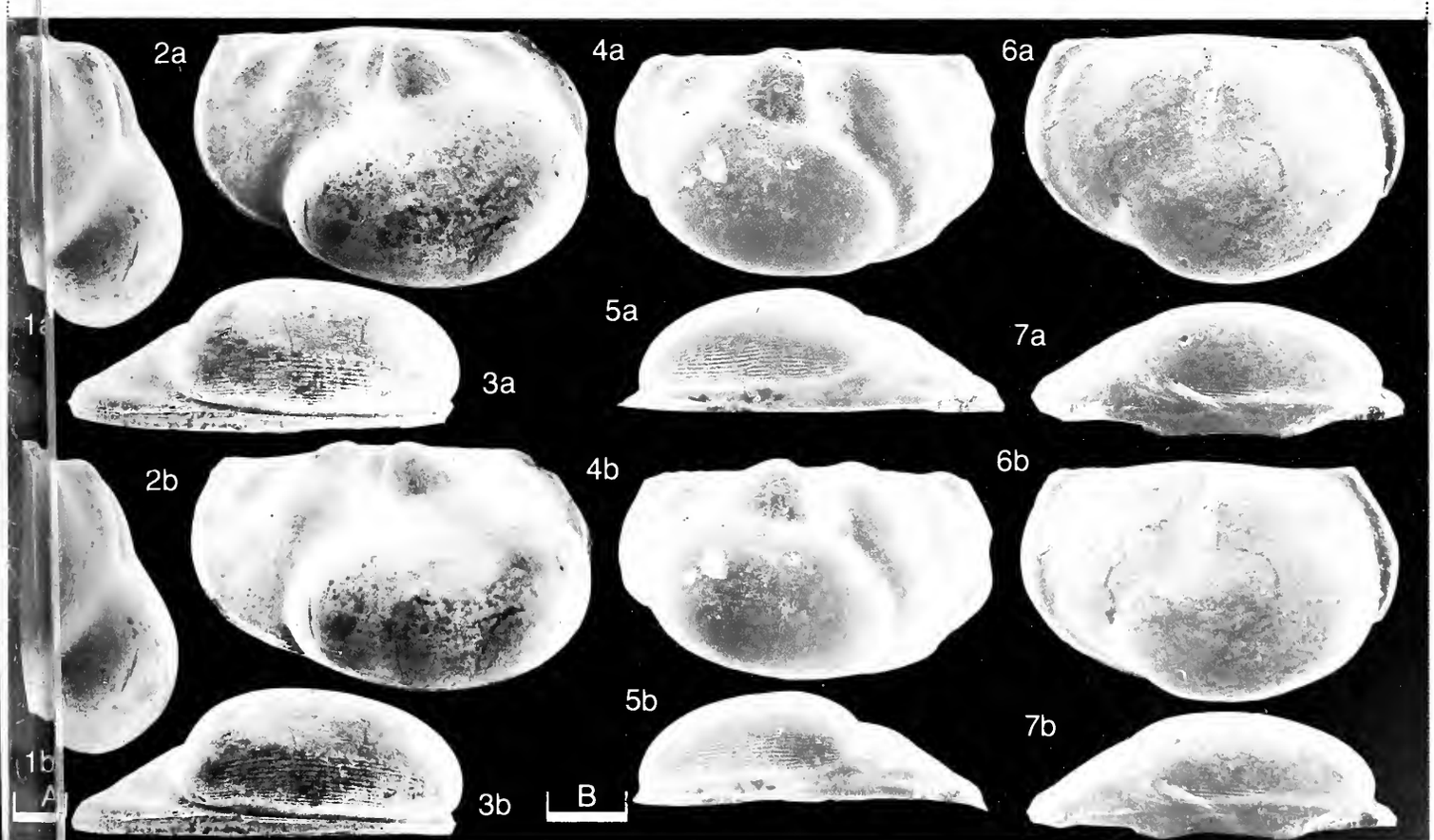
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336.1.11 (113.333) (430.2 : 161.013.54 + 014.52 + 438 : 161.017.51) : 551.351 + 552.54

ON *HEMSIELLA MACCOYIANA* (JONES)

by David J. Siveter & Wolfgang Hansch
(University of Leicester, England & University of Greifswald, German Democratic Republic)

Hemsiella maccoyiana (Jones, 1855)

1855 *Beyrichia maccoyiana* nov. sp. T. R. Jones, *Ann. Mag. nat. Hist.*, ser, 2, **16**, 88, pl. 5, fig. 14.
1855 *Beyrichia dalmaniana* nov. sp. T. R. Jones, *Ibid.*, 88, pl. 5, fig. 13.
1862 *Beyrichia maccoyiana* Jones; E. Boll. *Arch. Ver. Freunde Naturg. Mecklenb.*, **16** (7), 134, pl. 1, fig. 9.
1862 *Beyrichia dalmaniana* Jones; E. Boll, *Ibid.*, 127, pl. 1, fig. 15.
1909 *Beyrichia maccoyiana* Jones; J. Ch. Moberg & K. A. Grönwall, *Acta Univ. lund.*, N.F., **5** (1), 58, 81, 86, pl. 4, fig. 8, pl. 6, fig. 4; *non* fig. 5 (= *Hemsiella hians* (Boll, 1856)).
1957 *Beyrichia maccoyiana sulcata* Reuter; R. V. Kesling, *Contr. Mus. Paleont. Univ. Mich.*, **14** (6), pl. 4, figs. 7–9.
1957 *Beyrichia maccoyiana sulcata* Reuter; R. V. Kesling & K. J. Rogers, *J. Paleont.*, **31** (5), 1002–1003, pl. 128, figs. 1, 2, pl. 129, figs. 12–14.
1962 *Hemsiella maccoyiana* (Jones); A. Martinsson, *Bull. geol. Instn Univ. Uppsala*, **41**, 16–17, 221, 223, fig. 2B.
1962 *Hemsiella dalmaniana* (Jones); A. Martinsson, *Ibid.*, 16–17, 221, 223, fig. 2C.
1962 *Beyrichia (Neobeyrichia) maccoyiana* var. *sulcata* Reuter; M. J. Copeland, *Palaeontology*, **3**, 99, pl. 23, figs. 14–16.
1964 *Hemsiella* cf. *maccoyiana* (Jones); A. Martinsson, *Geol. För. Stockh. Förh.*, **86** (2), 133–135, figs. 4a–c.
1964 *Hemsiella maccoyiana* (Jones); A. Martinsson, *Ibid.*, **86**, 241–242, fig. 2F.
1964 *Hemsiella maccoyiana sulcata* Reuter; M. J. Copeland, *Bull. geol. Surv. Can.*, **117**, 8–9, pl. 1, fig. 3.
1965 *Hemsiella dalmaniana* (Jones); L. Gailite, *Latv. PSR zinat. Akad. Vest.*, **2** (211), 68–70.
1966 *Hemsiella maccoyiana* (Jones) (= *dalmaniana*); D. Kaljo & L. Sarv, *Eesti NSV Tead. Akad. Toim.*, ser. Tekhn. Fiz.-Mat. **2**, 279, tab. 1.
1967 *Hemsiella maccoyiana* (Jones); A. Martinsson, *Geol. För. Stockh. Förh.*, **89** (3), 375–377.
1967 *Hemsiella dalmaniana* (Jones), 1855; L. Gailite, *in*: L. Gailite, M. Rybnikowa & R. Ulste, *Stratigrafija, fauna i uslovija obrazovanija silurijskich porod srednej Pribaltiki*, 121–122, pl. 8, figs. 2a–e, Riga (Zinatne).

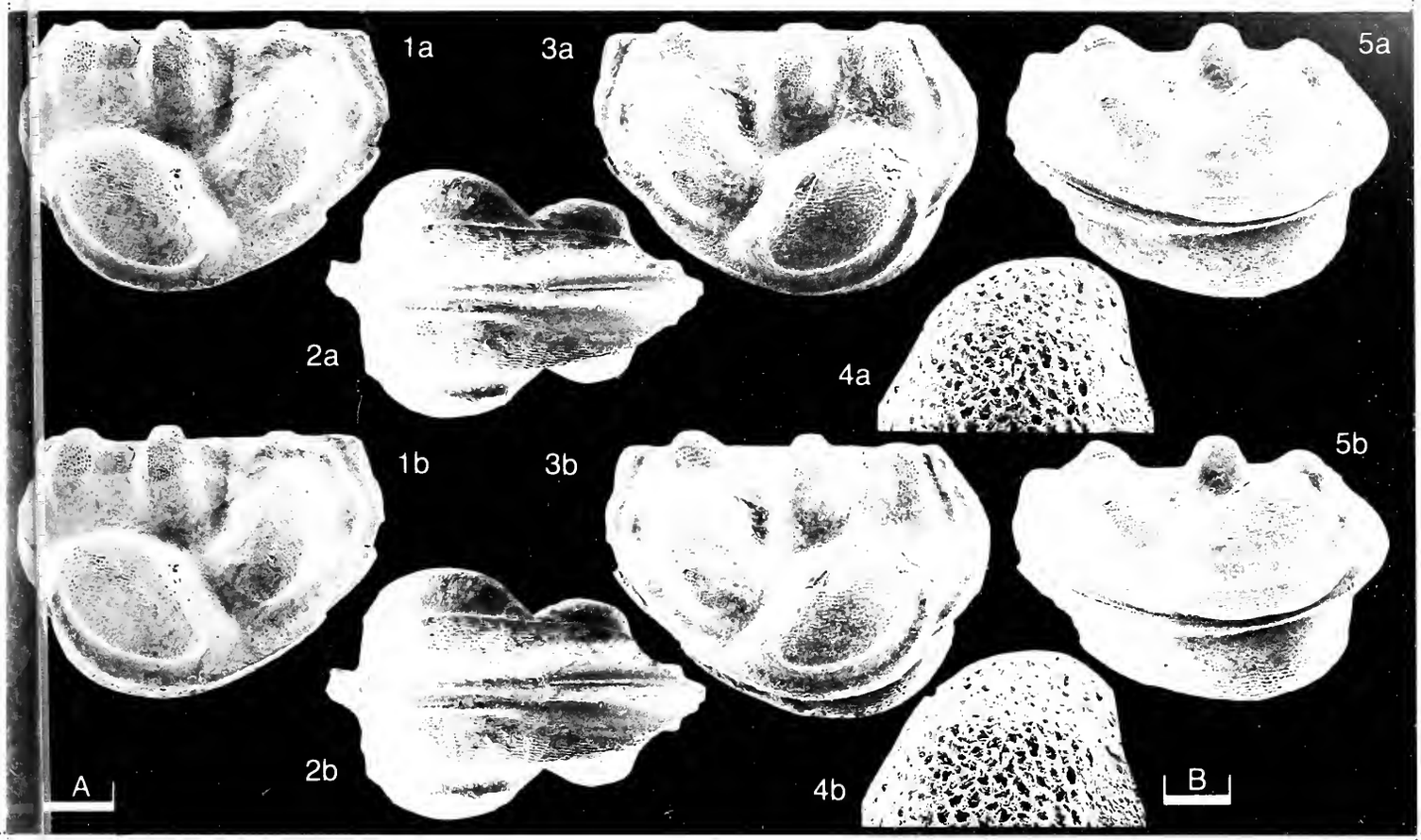
Explanation of Plate 17, 54

Figs. 1–5, ♀ car. (**SGWG 83/7**, 2020 μm long): fig. 1, LV ext. lat.; fig. 2, ext. vent.; fig. 3, RV ext. lat., fig. 4, cusp of ant. lobe of LV; fig. 5, ext. RV, vent. obl. Scale A (375 μm; ×26), figs. 1–3, 5; scale B (75 μm; ×120), fig. 4.

1968 *Hemsiella* cf. *maccoyiana* (Jones); L. Sarv, *Ostrakody Craspedobolbinidae, Beyrichiidae i Primitiopsidae silura Estonii*, 24, pl. 7, figs. 1–4, tabs. 2, 3, Tallinn (Valgus).
1970 *Hemsiella* cf. *maccoyiana* (Jones); L. Sarv, *in*: D. Kaljo (Ed.), *Silur Estonii*, 158, 169–170, 299 Tallinn (Valgus).
1970 *Hemsiella dalmaniana* (Jones); A. Pranskevicius, *Dokl. Akad. Nauk SSSR*, **192** (6), 85.
1971 *Hemsiella maccoyiana* (Jones); R. W. L. Shaw, *Palaeontology*, **14**, 597, pl. 109, figs. 1–4.
1971 *Hemsiella* cf. *maccoyiana* (Jones); L. Sarv, *Eesti NSV Tead. Akad. Toim.*, Khim. Geol., **20** (4), 353, 355, tab. 2.
1972 *Hemsiella dalmaniana* (Jones); A. Pranskevicius, *Geol. För. Stockh. Förh.*, **94**, 439.
1972 *Hemsiella dalmaniana* (Jones); A. Pranskevicius, *Trudy LitNIGRI*, **15**, 20, 35, 77, tabs. 1, 2, fig. 11 (log), pl. 8, figs. 1–3.
1972 *Hemsiella dalmaniana* (Jones); L. Gailite, *Eesti NSV Tead. Akad. Toim.*, Khim. Geol., **21**, 352–353.
1973 *Hemsiella dalmaniana* (Jones); B. Zbikowska, *Acta geol. pol.*, **23**, 610, 614, 623, tab. 2, pl. 4, figs. 1, 2.
1974 *Hemsiella dalmaniana* (Jones); E. Tomczykowa & E. Witwicka, *Biul. Inst. geol.*, **276**, 59, 61, 68, figs. 2, 3 (logs).
1974 *Hemsiella dalmaniana* (Jones); B. Zbikowska, *Bull. Acad. pol. Sci. Ser. Sci. Terre*, **22** (1), 47.
1975 *Hemseilla dalmaniana* (Jones); A. Pranskevicius, *Geol. För. Stockh. Förh.*, **97**, 53–54.
1977 *Hemsiella* cf. *maccoyiana* (Jones); L. Sarv, *in*: D. Kaljo (Ed.), *Fazii i fauna silura Pribaltiki*, 161, 164, 169, 173–175, tabs. 1–7.
1977 *Hemsiella maccoyiana sulcata* (Reuter); M. J. Copeland & J. M. Berdan, *Geol. Surv. Pap. Can.*, **77–1B**, pl. 2, 3, figs. 9, 10.
1978 *Hemsiella dalmaniana* (Jones); T. I. Moiseeva, *in*: *Stratigrafičeskie i paleontologičeskie issledovanija v Belorussii*, 59, 178, tab. 7.
1978 *Hemsiella dalmaniana* (Jones); L. Gailite, *in*: *Stratigrafija fanerozoja Pribaltiki. Paleontologičeskie kompleksy, stroenie i sostav otlozenie*, 16, 18–20, Riga (Zinatne).
1982 *Hemsiella maccoyiana* (Jones); L. Sarv, *in*: D. Kaljo & E. Klaamann (Eds.), *Ecostratigraphy of the East Baltic Silurian*, 74–75, Tallinn (Valgus).
1985 *Hemsiella maccoyiana* (Jones); W. Hansch, *Lethaia*, **18**, 275, 277, tab. 1.
1985 *Hemsiella dalmaniana* (Jones); W. Hansch, *Ibid.*, 275, tab. 1.
1986 *Hemsiella maccoyiana* (Jones); L. Gailite, *in*: D. Kaljo & E. Klaamann (Eds.), *Teorija i onyt ecostratigrafija*, 113, Tallinn (Valgus).
1986 *Hemsiella dalmaniana* (Jones); I. Sidaraviciene, *Ibid.*, 119, 124.
1988 *Hemsiella maccoyiana* (Jones); W. Hansch, *Neues Jb. Geol. Paläont. Mh.*, **1988**, 481–482, 491.
1988 *Hemsiella dalmaniana* (Jones); W. Hansch, *Ibid.*
1989 *Hemsiella maccoyiana* (Jones); D. J. Siveter, *in*: M. G. Bassett & C. H. Holland (Eds.), *A global standard for the Silurian System*, 263, fig. 168G, Nat. Mus. Wales Geol. Ser., No. 9, Cardiff.

Explanation of Plate 17, 56

Figs. 1–7, ♂ car. (**SGWG 83/8**, 2110 μm): fig. 1, LV syllobial cusp; fig. 2, detail of velum of LV; fig. 3, LV ext. lat.; fig. 4, ext. vent.; fig. 5, RV ext. lat.; figs. 6, 7, RV syllobial cusp. Fig. 8, ♀ car., LV syllobial cusp (**SGWG 83/7**).
Scale A (75 μm; ×125), fig. 1; scale B (30 μm; ×300), fig. 2; scale C (375 μm; ×26), figs. 3–5; scale D (50 μm; ×180), fig. 6; scale E (15 μm; ×600), fig. 7; scale F (75 μm; ×90), fig. 8.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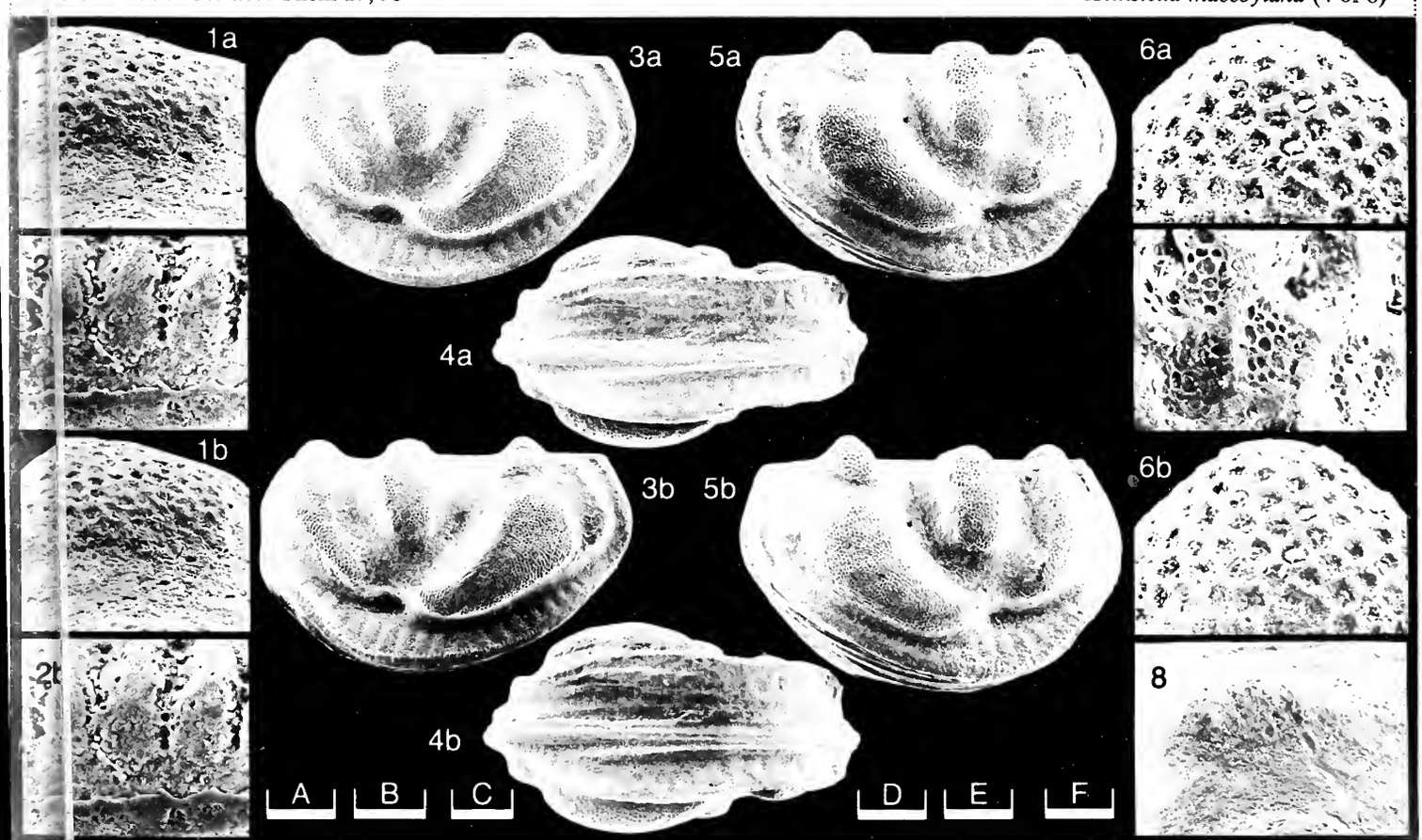
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Lectotype: British Museum (Nat. Hist.), **I 6953**; tecnomorphic RV. Martinsson, 1962, 16, fig. 2B; Jones, 1855, pl. 5, fig. 14. [Paratypes: **I 7019**, ♀ RV (Martinsson, 1962, 16, fig. 2C); **I 7018**, ♀ LV (Jones, 1855, pl. 5, fig. 13).]

Type locality: Erratic boulder no. 2 of Jones, 1855, near Breslau (Wrocław), Poland; approx. lat. 51° 5′ N, long. 17° E.

Figured specimens: Sektion Geologische Wissenschaften der E.-M.-Arndt-Universität Greifswald, GDR, nos. **SGWG 83/7** (♀ car.: Pl. **17**, 54, figs. 1–5; Pl. **17**, 56, fig. 8), **SGWG 83/8** (♂ car.: Pl. **17**, 56, figs. 1–7) and **SGWG 83/10** (♂ car.: Pl. **17**, 58, figs. 4, 7), from erratic boulder no. Bey. B10, Sellin, Isle of Ruegen, GDR; lat 54° 23′ N, long. 13° 41′ E. **SGWG 83/9** (♀ RV: Pl. **17**, 58, figs. 1–3; Pl. **17**, 60, fig. 4), **SGWG 83/11** (♀ LV: Pl. **17**, 58, figs. 5, 6; Pl. **17**, 60, fig. 3) and **SGWG 83/12** (tecnomorphic LV: Pl. **17**, 60, figs. 1, 2) from erratic boulder no. Bey B16, Oderberg-Bralitz, GDR; lat. 52° 52′ N, long. 14° 3′ N. British Museum (Nat. Hist.), nos. **I 7019** (paratype, ♀ RV: Pl. **17**, 60, figs. 5, 6) and **I 7018** (paratype, ♀ LV: Pl. **17**, 60, fig. 9), both from erratic boulder no. 3 of Jones, 1855, near Breslau (Wrocław), Poland ; **I 6953** (lectotype, tecnomorphic RV: Pl. **17**, 60, figs. 7, 8), from erratic boulder no. 2 of Jones, 1855, near Breslau (Wrocław), Poland.

Diagnosis: *Hemsiella* species in which the syllobium is more or less dissected by a dorsal depression in both sexes. Right valves show a distinct depression below the rounded, protuding cuspidal part of syllobium, in left valves this depression is shallower and the cusp not so protusive over the dorsal margin. Crumina shows a wide, depressed unornamented zone lateral to velar ridge, and is reticulostriate between the velar ridge and valve margin. Lobes and lateral surface of crumina are either reticulate, reticulostriate, weakly punctate or smooth.

Remarks: *Hemsiella* is a well defined genus but one containing many taxa showing wide and often overlapping intraspecific variation. For example, Hansch (1988) considered that *H. hians* (Boll, 1856), *H. elegans* (Boll, 1862) and the type-species *H. loensis* Martinsson, 1962, were synonymous. Furthermore, Martinsson (e.g. 1962, 223; 1964, 134) noted the wide intraspecific characteristics of *H. dalmaniana* and *H. maccoyiana*, species for which he erected lectotypes. Both species names have been used in the literature but we prefer to adopt *H. maccoyiana* because of the more extensive recent use. *H. maccoyiana mclearni* Copeland, 1964 and *H. latviensis* Gailite, 1967 also are very similar to *H. maccoyiana*. As noted by Hansch (1988, 481) there are three groups of *Hemsiella* species, characterised by *H. hians* (Boll, 1856), *H. maccoyiana* (Jones, 1855) and *H. pulchricruminata* Martinsson, 1862.

Gailite (1967) was the first to note an assymmetry in the syllobial morphology between right and left valves of '*Hemsiella dalmaniana*' specimens from the Piltene 1 borehole in Latvia. Usually the dorsally depressed, unornamented area is larger in the left valve. Furthermore, the anterior lobe of the left valve is

Explanation of Plate 17, 58

Figs. 1–3, ♀ RV (**SGWG 83/9**, 1640 μm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, ext. ant. Figs. 4, 7, ♂ car. (**SGWG 83/10**, 2360 μm long): fig. 4, vent. detail; fig. 7, ext. ant. Figs. 5, 6, ♀ LV (**SGWG 83/11**, 2000 μm long), fig. 5, detail of ventral side of crumina; fig. 6, ext. post. Scale A (300 μm; ×30), figs. 1–3, 6, 7; scale B (150 μm; ×60), fig. 4; scale C (150 μm; ×70), fig. 5.

typically more prominent than in the right valve. Sometimes the ornament, especially that of the syllobium of both sexes and of the crumina, is effaced. The denticles of the velar border crest and the tubulosity of the velum are only visible in tecnomorphs, which also show the typical anteroventral undulation of the velum and a weak toric ridge which in some tecnomorphs (right valve only) appears to be divided into two (Pl. **17**, 56, fig. 4). There is no velum in front of the crumina. In small tecnomorphs the preadductorial node is better connected with the anterior lobe and the syllobium than in adults.

Distribution: Canada: Upper Stonehouse Formation, Nova Scotia (Copeland, 1964, Copeland & Berdan, 1977).

Great Britain: Upper Underbarrow Flags, Kirkby Moor Flags and Scout Hill Flags, Cumbria; Whitcliffe Formation and Downtown Castle Sandstone Formation, Long Mountain region; Whitcliffe Formation, Ludlow area (Shaw, 1969, 1971; see also Siveter, 1980).

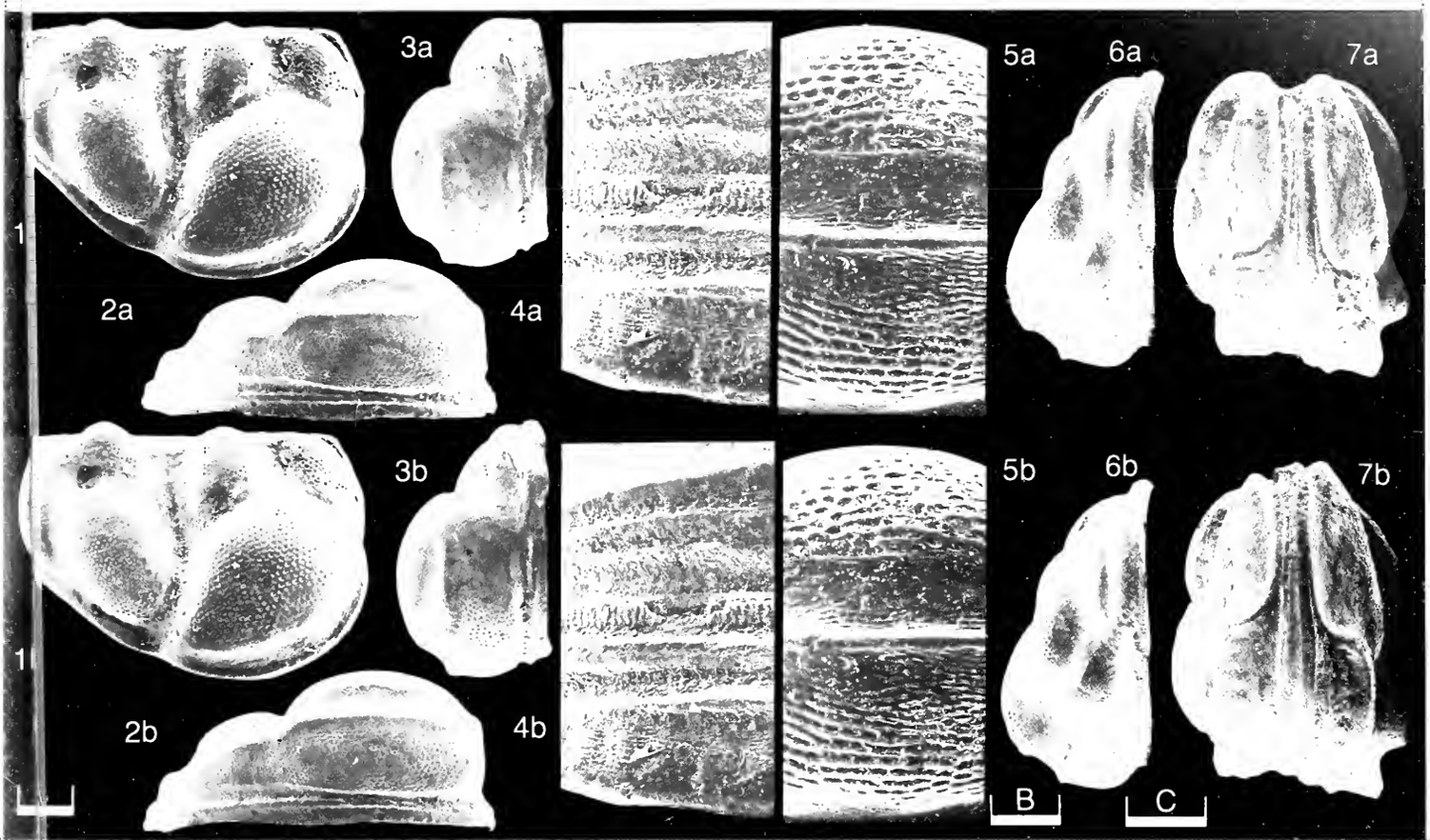
Peribaltic area of Poland: Łeba 1 borehole; Beyrichienkalk pebbles in the 'Zechsteinkonglomerat' (Martinsson, 1964). Lebork and Wejherowo boreholes; post-Ludlow (Witwicka, 1967). Łeba 2, 5 and Debki 3 boreholes; post-Ludlow, *Neobeyrichia incerta* to *Nodibeyrichia tuberculata* zones (Zbikowska, 1973). Miloszewo, Wejherowo, Karwia, Opalina, Salino, Bialogard, Łeba and Lebork IG 1 boreholes; post-Ludlow, *Neobeyrichia incerta* to *Kloedenia wilckensiana* zones (Tomczykowa & Witwicka, 1974). Chojnice borehole; post-Ludlow (Zbikowska, 1974).

East Baltic area, U.S.S.R.: Ohesaare 1 and 2 boreholes, Isle of Saremaa, Estonia; Kaugatuma and Ohesaare formations (Sarv, 1968, 1971). Piltene 1, 31, 32, Ezere 9, Talcy 55, Pavilosta 51, Kolka 1, 54 and Stoniskjaj boreholes, Latvia; Minija and Jura formations (Gailite, 1967, 1978). Kunkojaj and Virbalis boreholes, Kaugatuma and Ohesaare formations (Sarv, 1977); Taurage borehole, Minija Formation (Pranskevicius, 1972); boreholes 94, 96, 98, 110, 112 and 89 (Minija Formation) and boreholes 89, 98, 110, 112 and possibly 108 (Jura Formation), Arjogalskij profile, Lithuania (Sidaraviciene, 1986). Dubovskoje borehole, Kaliningrad district; Kaugatuma Formation (Kaljo & Sarv, 1976). Brest basin, Muchavez and Kustin beds (Moiseeva, 1978).

Sweden: Scania, Klinta Formation (?) and Öved Sandstone *sensu* Jeppsson & Laufeld (*Sver. geol. Unders. Afh.*, ser. Ca, **58**, 1987); see also Moberg & Grönwall, 1909. Erratic boulders, Beyrichienkalk *sensu* Martinsson (1963, 1967, 1977); Beyrichienkalk type B, C and "Red Beyrichienkalk" *sensu* Hansch (1985).

Explanation of Plate 17, 60

Figs. 1, 2, tecnomorphic LV (**SGWG 83/12**, 1530 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. Fig. 3, ♀ LV, ext. lat. (**SGWG 83/11**). Fig. 4; ♀ RV, detail of crumina (**SGWG 83/9**). Figs. 5, 6, ♀ RV (paratype, **I 7019**, approx. 1620 μm long): fig. 5, ext. lat.; fig. 6, ext. vent. Figs. 7, 8, tecnomorphic RV (lectotype, **I 6953**, approx. 1510 μm long): fig. 7, ext. lat.; fig. 8, detail of syllobium. Fig. 9, ♀ LV, ext. lat. (paratype, **I 7018**, 1680 μm long). Scale A (300 μm; ×30), figs. 1, 2; scale B (375 μm; ×25), fig. 3; scale C (30 μm; ×300), fig. 4; scale D (300 μm; ×30), figs. 5–7; scale E (75 μm; ×120), fig. 8; scale F (300 μm; ×27), fig. 9.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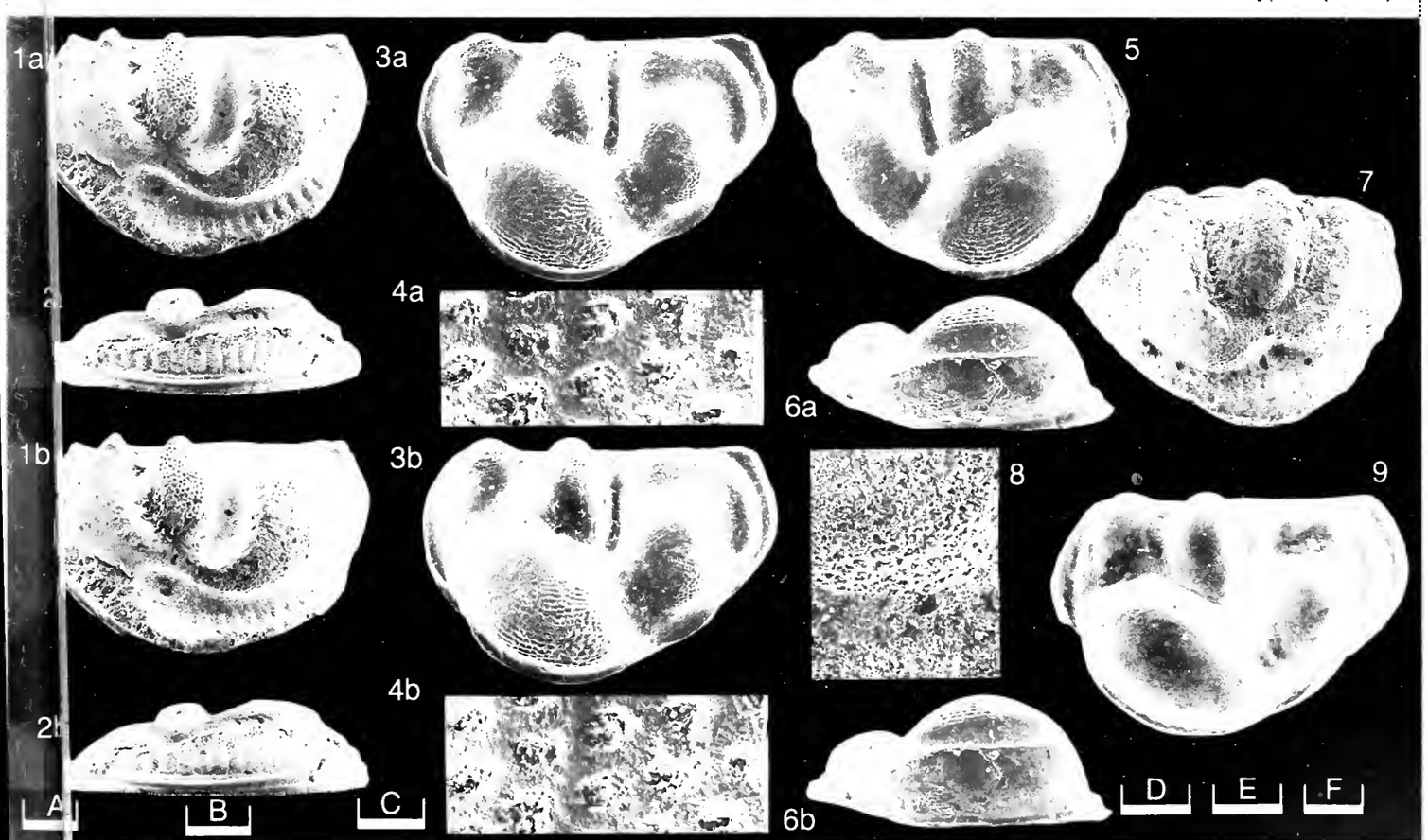
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595.337.14 (116.331) (64.161.007.39) : 551.35 + 552.54

ON *CYTHEROPTERON GLINTZBOECKELI* (DONZE & LEFÈVRE)

by Richard Symonds
(Institute of Earth Studies, University College of Wales, Aberystwyth)

Cytheropteron glintzboeckeli (Donze & Lefèvre, 1981)

1963 *Cytheropteron* sp. 2, M. Masoli, *Mém. Bur. Rech. geol. minièr.*, **32**, 122–123, pl. 1, figs. 4a–4d.
1981 *Eocytheropteron glintzboeckeli* sp. nov. P. Donze & J. Lefèvre, *in* H. Bismuth *et al.*, *Cah. Micropaléont.*, **1981–3** (2), 58, pl. 1, figs. 13–16.
1984 *Eocytheropteron glintzboeckeli* Donze & Lefèvre; H. Bismuth, *Bull. Cent. Rech. Explor.-Prod. Elf-Aquitaine*, **8**, 471–472. (q.v. for full pre-1984 synonymy).
1985 *Eocytheropteron glintzboeckeli* Donze & Lefèvre; J. Vivière, *Les Ostracodes du Crétacé supérieur (Vraconien à Campanien basal) de la région de Tébessa (Algérie du Nord-Est): Stratigraphie, Paléoécologie, Systématique*, Univ. P. & M. Curie, Paris VI, 250, pl. 26, figs. 6, 7.

Holotype: Service geologique de Tunisie (Tunis), no. **C-Ce 13**; car.
Type locality: Djebel Semmama (central N Tunisia), lat. 39° 20′ N, long. 7° 15′ E. Cretaceous (Cenomanian).
Figured specimens: British Museum (Nat. Hist.) specimen nos. **OS 13454** (LV: Pl. **17**, 62, fig. 1), **OS 13455** (car: Pl. **17**, 62, fig. 2), **OS 13456** (RV: Pl. **17**, 62, fig. 3), **OS 13457** (RV: Pl. **17**, 64, figs. 1, 3), **OS 13458** (LV: Pl. **17**, 64, figs. 2, 4). From Cenomanian marls (Marnes d'Ait Lamine) exposed by coast road c. 20 km N of Agadir, Morocco. Sample taken 150 m stratigraphically above prominent Albian limestones (Calcaires dolomitiques du Kechoula); lat. 30° 33′ 30″ N, long. 9° 44′ 30″ W.

Explanation of Plate 17, 62

Fig. 1, LV, ext. lat. (**OS 13454**, 700 μm long); fig. 2, car., dors. (**OS 13455**, 710 μm long); fig. 3, RV, ext. lat. (**OS 13456**, 680 μm long).
Scale A (200 μm; ×90), figs. 1–3.

Diagnosis: Alate; angular flange extends from anterior around alar process and towards posterior; above flange ornament has appearance of overlapping plates, beneath flange on flat ventral surface are a series of sub-parallel ridges; both valves have single spine below caudal process; subrhombic outline in dorsal view.

Remarks: The specimens illustrated herein have been compared to topotypes (W. Austin, 1988, unpublished MSc thesis, UCW Aberystwyth) and are conspecific.

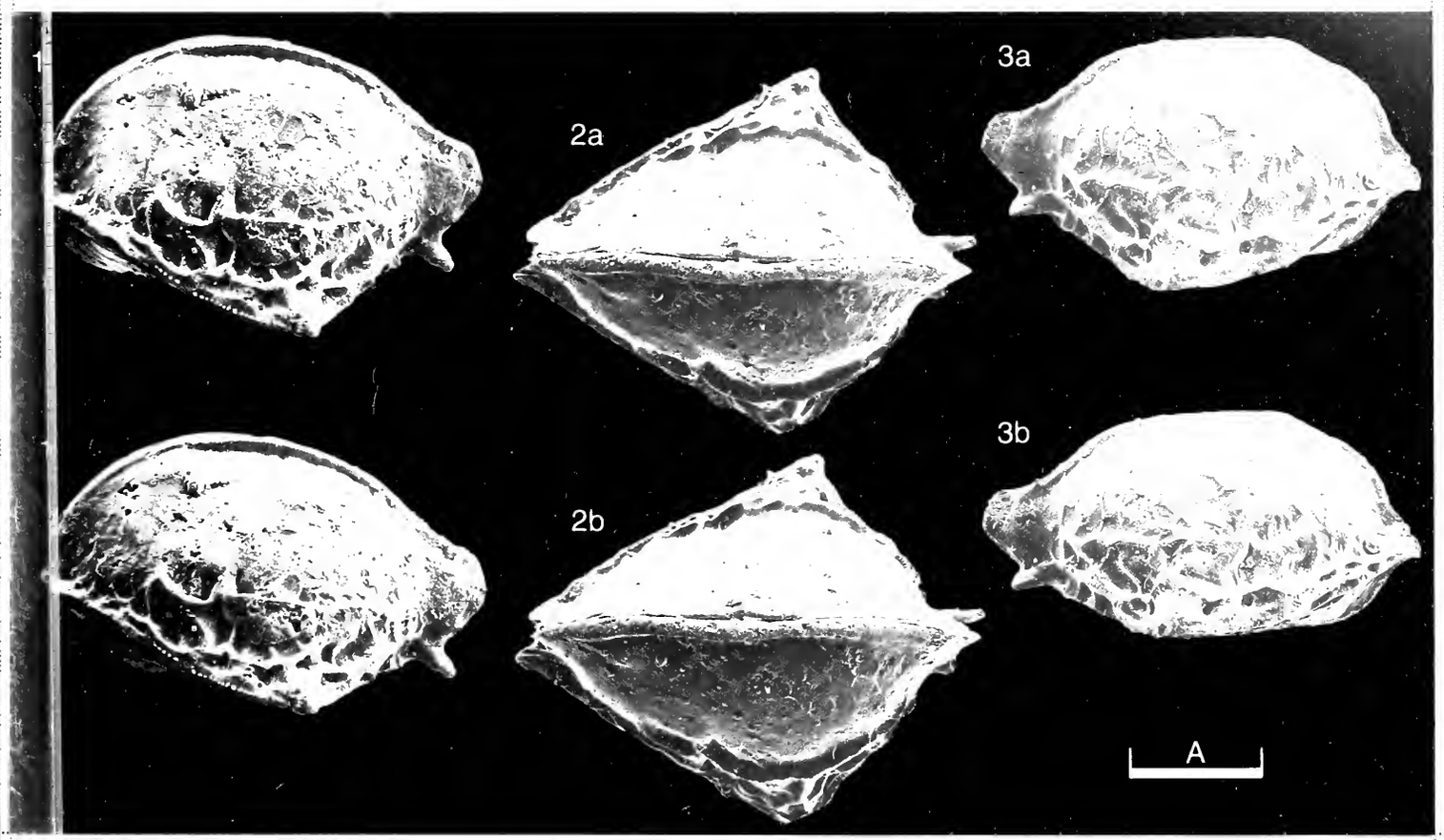
The micrographs reveal hitherto undescribed features of the ornament; an alar spine, a line of small pustules along the alar flange and a very fine "string of pearls" polygonal reticulation over much of the carapace. The hinge is antimerodont and the adductor muscle scars are arranged in a column of four with a circular frontal scar about twice the diameter of the small mandibular scar.

Previous authors have placed this species in the genus *Eocytheropteron* Alexander, 1933. However the original generic description of *Eocytheropteron* (C. A. Alexander, *J. Paleont.*, **7**, 181–214, 1933) states that the genus is like *Cytheropteron* Sars, 1866, in most respects but that the species within it "do not bear any trace of wing-like lateral expansions". This species is therefore more appropriately ascribed to the genus *Cytheropteron*.

Distribution: Previously recorded from Tunisia, NE Algeria (Vivière, 1985 *op. cit.*), and, as an unnamed species, from S Morocco (Masoli, 1963 *op. cit.*). The stratigraphic range of this species in Morocco is Vraconian (Late Albian) to Early Cenomanian (acme); this is consistent with previously assigned stratigraphic ranges.

Explanation of Plate 17, 64

Fig. 1, RV, int. obl. vent. (**OS 13457**, 700 μm long); fig. 2, LV, int. muscle scars (**OS 13458**, photo 120 μm long); fig. 3, RV, int. hinge (**OS 13457**, photo 210 μm long); fig. 4, LV, int. obl. vent. (**OS 13458**, 710 μm long).
Scale A (200 μm; ×100), figs. 1, 4; scale B (50 μm; ×410), fig. 2; scale C (100 μm; ×210), fig. 3.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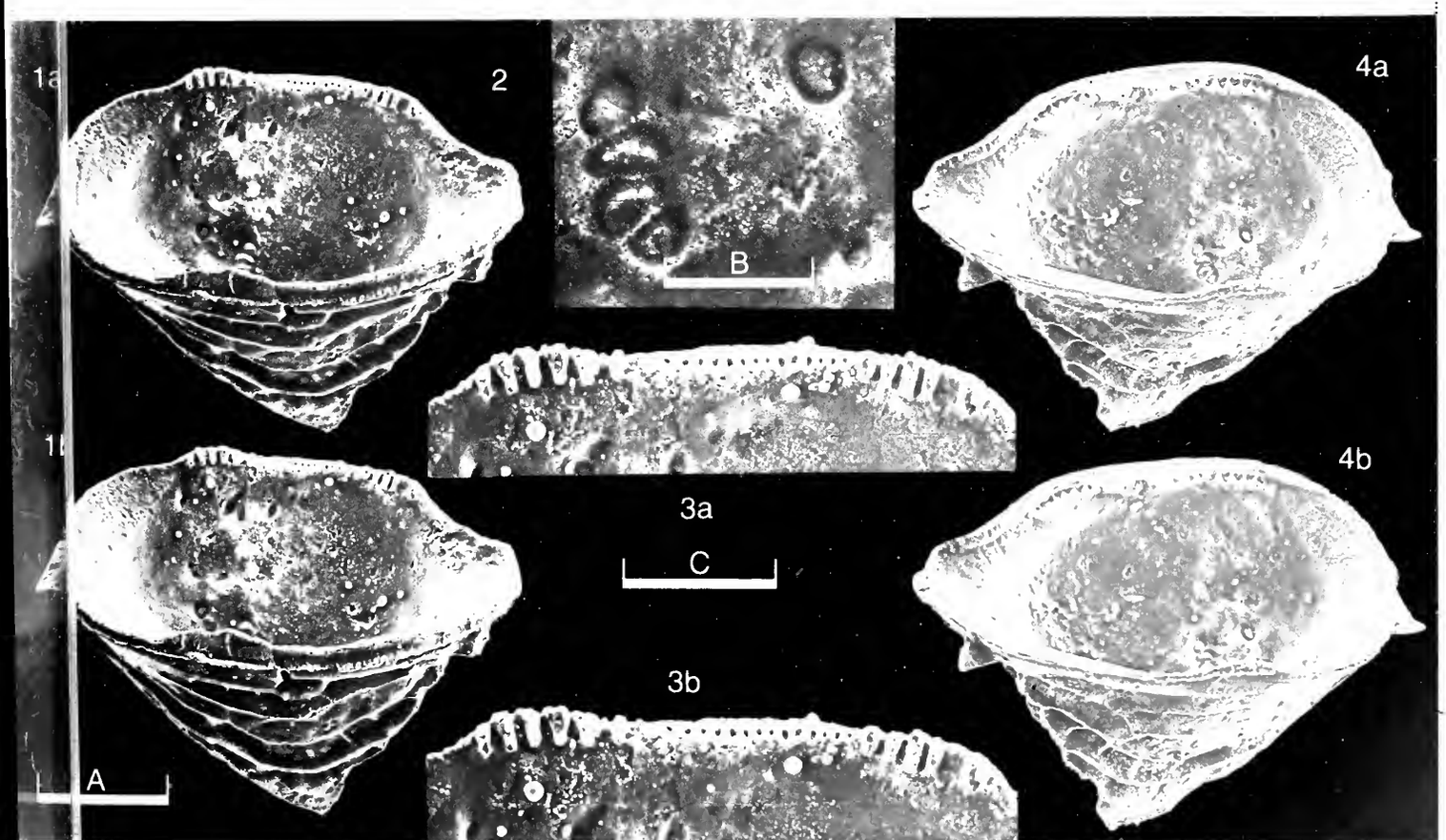
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595.337.14 (118.22) (44 : 162.002.48) : 551.351 + 552.51 + 552.52

ON *LOXOCORNICULUM GRATELOUPIANUM* (BOSQUET)

by Caroline A. Maybury
(Institute of Earth Studies, University College of Wales, Aberystwyth)

Loxocorniculum grateloupianum (Bosquet, 1852)

1852 *Cythere grateloupiana* sp. nov. J. Bosquet, *Mém. cour. Acad. r. Sci. Belg.*, **24**, 81, pl. 4, fig. 3.
non 1878 *Loxoconcha grateloupiana* (Bosquet); G. S. Brady, *Trans. zool. Soc. Lond.*, **10**, 399, pl. 68, figs. 3a–g.
non 1918 *Loxoconcha grateloupiana* (Bosquet); W. N. Kuiper, *Oligocäne und Miocäne Ostracoden aus den Niederlanden*, Gebroeders Hoitsema, Groningen, 23, pl. 1, figs. 6a–c.
1956 *Loxoconcha grateloupiana* (Bosquet); H. J. Oertli, *Schweiz. palaeont. Abh.*, **74**, 68, pl. 8, fig. 210.
1957 *Loxoconcha grateloupiana* (Bosquet); A. J. Keij, *Mém. Inst. r. Sci. nat. Belg.*, **136**, 140, pl. 21, fig. 19; pl. 22, figs. 9–11.
1965 *Loxoconcha grateloupiana* (Bosquet); J. Moyes, *Les Ostracodes du Miocène Aquitain. Essai de paléoécologie stratigraphique et de paléogéographie*, Univ. Bordeaux (Drouillard Impr.), 70, pl. 7, fig. 1.
1985 *Sagmatocythere ? grateloupiana* (Bosquet); P. Carbonel *in*: H. J. Oertli (Ed.), Atlas des Ostracodes de France, *Bull. Centres Rech. Explor.-Prod. Elf-Aquitaine*, **9**, 326, pl. 93, figs. 3–4.

Lectotype: Roy. Inst. Nat. Sci. Belg., Brussels, ♂ RV (Bosquet Coll., no. **44**), designated Keij, *op. cit.*
Type locality: Léognan, Aquitaine Basin, France; Lower Miocene.
Figured specimens: British Museum (Nat. Hist.) nos. **OS 13480** (♀ LV: Pl. **17**, 66, fig. 1), **OS 13481** (♀ RV: Pl. **17**, 66, fig. 2), **OS 13482** (♂ LV: Pl. **17**, 66, fig. 3), **OS 13483** (♂ RV: Pl. **17**, 68, fig. 1), **OS 13484** (♂ RV: Pl. **17**, 68, figs. 2–4). All specimens are from Apigné, near Rennes (approx. lat. 48°07′N, long. 1°41′W), NW France; Upper Pliocene, Redonian. **OS 13480** and **OS 13481** from the grey, marine sands of Apigné Borehole II; **OS 13482** and **OS 13484** from the shell-rich sand of the cutting at Le Temple du Cerisier and **OS 13483** from the yellow, argillaceous, calcareous sands with high clay content of Gîte d'Apigné (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8–26, 1968).

Explanation of Plate 17, 66

Fig. 1, ♀ LV, ext. lat. (**OS 13480**, 620 μm long); fig. 2, ♀ RV, ext. lat. (**OS 13481**, 630 μm long); fig. 3, ♂ LV, ext. lat. (**OS 13482**, 710 μm long).
Scale A (100 μm; ×100), figs. 1–3.

Diagnosis: A medium to large (adults 600–750 μm long), coarsely reticulate *Loxocorniculum*, with a rounded posteroventral protuberance and just posterior and immediately below this, a smooth, deeply depressed area. Hinge modified gongylodont with a crenulate median element. Adductor muscle scars a curved row of 4.

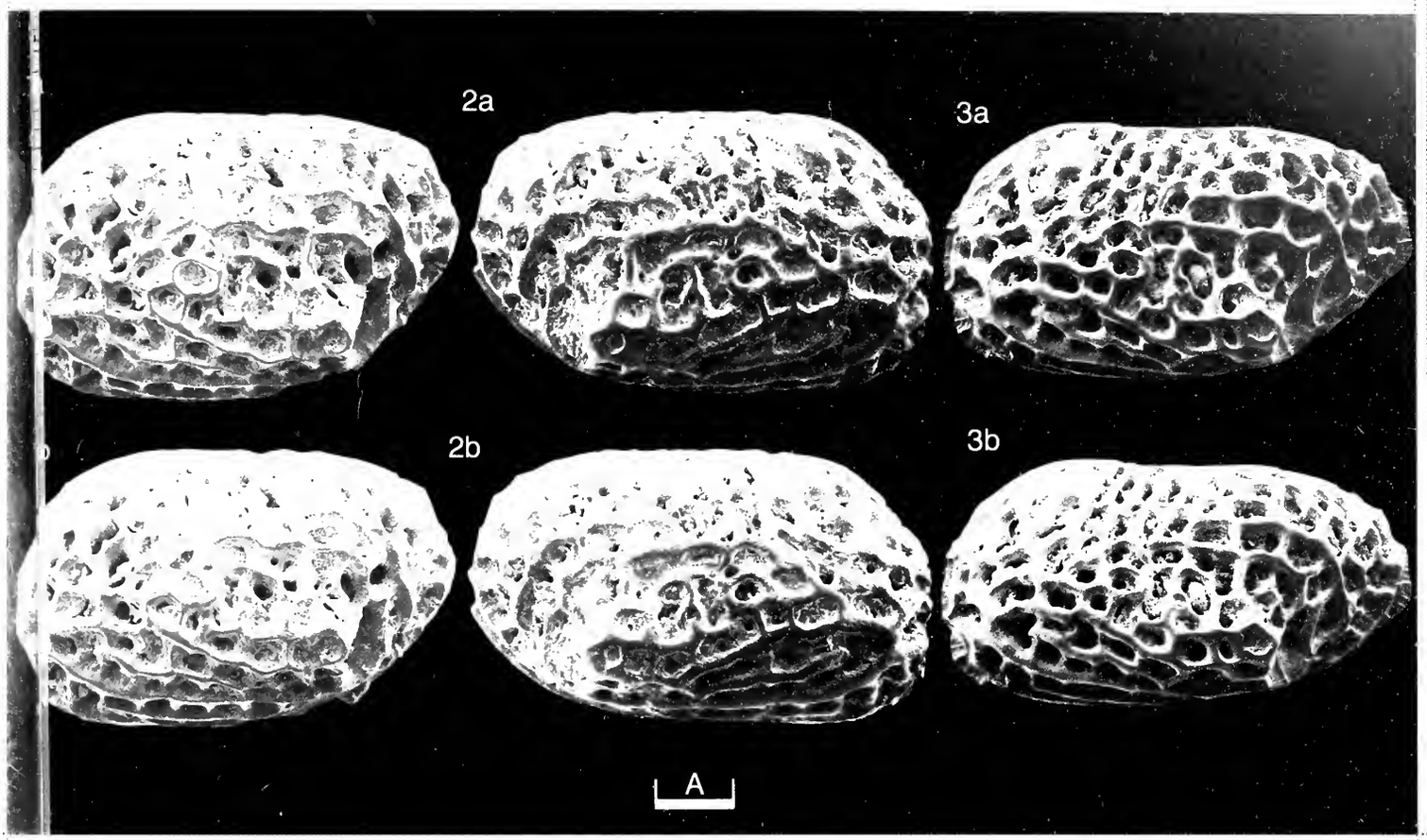
Remarks: Oertli (pers. comm.) has compared the present material with specimens of *grateloupianum* from the type region and has confirmed the two are the same. The generic assignment of Bosquet's species, however, has proved problematical. Its gongylodont (*s.l.*) hinge undoubtedly led Oertli (1956, *op. cit.*), Keij (1957, *op. cit.*) and Moyes (1965, *op. cit.*) to refer the species to *Loxoconcha*, but other authors, notably Bassiouni (*Roemeriana*, **3**, 65, 1962), Neale (*Scient. Rep. Br. Antarct. Surv.*, **58**, 19, 1967) and Carbonel *in* Oertli (1985, *op. cit.*) have assigned it to *Kuiperiana, Myrena* and *Sagmatocythere*? respectively because of the somewhat aberrant nature of the gongylodont hinge and the fact that the species' ornament and outline are not typical of *Loxoconcha*. I, however, regard *Myrena* (Neale, 1967, *op. cit.*) as a junior synonym of *Kuiperiana* Bassiouni (1962, *op. cit.*), a genus that is chartacterised by a gongylodont hinge with a smooth to weakly crenulate median element and a posterior curved tooth in the RV with a frill-like dorsal surface. Furthermore, it is not like *Sagmatocythere* Athersuch (*Stereo-Atlas of Ostracod Shells*, **3**, 117–124, 1976) because the latter has a gongylodont hinge with a smooth median element and a pronounced posterior curved tooth, which are lacking in *grateloupianum* (see Pl. **17**, 68, figs. 2–4). I have, instead, assigned the species to *Loxocorniculum* Benson & Coleman (*Paleont. Contr. Univ. Kans.*, **31**, 38, 1963) on account of its lateral outline, ornament and hinge structure. Although *grateloupianum* does not possess the posterodorsal protuberance of typical *Loxocorniculum*, this may be observed in a closely related species, *L. micrograteloupianum* Maybury (*Stereo-Atlas of Ostracod Shells*, **17**, 69–72, 1990). In addition, the type species of *Loxocorniculum*, *Cythere fischeri* Brady (*in* L. De Folin & L. Perier (Eds.), *Les Fonds de la Mer*, Savy, Paris, **4**(1), 154, pl. 18, figs. 15–16, 1869), has a pronounced, posteroventral protuberance adjacent and dorsal to a broad posteroventral depression, which is present in *grateloupianum*.

Brady (1878, *op. cit.*) and Kuiper's (1918, *op. cit.*) material appears to consist of several discrete species none of which is conspecific with Bosquet's taxon.

Distribution: Middle Oligocene (Rupelian) and Miocene (Aquitanian-Helvetian) of France (Keij, 1957, *op. cit.*; Oertli, 1956, *op. cit.* and Moyes, 1965, *op. cit.*). I have found it at several Upper Pliocene (Redonian) localities in NW France: Palluau I and Apigné II boreholes, Gîte d'Apigné and Le Temple du Cerisier (herein).

Explanation of Plate 17, 68

Fig. 1, ♂ RV, ext. lat. (**OS 13483**, 680 μm long); figs. 2–4, ♂ RV (**OS 13484**, 660 μm long): fig. 2, int. lat.; fig. 3, ant. hinge element; fig. 4, post. hinge element.
Scale A (100 μm; ×100), figs. 1, 2; scale B (40 μm; ×263), figs. 3, 4.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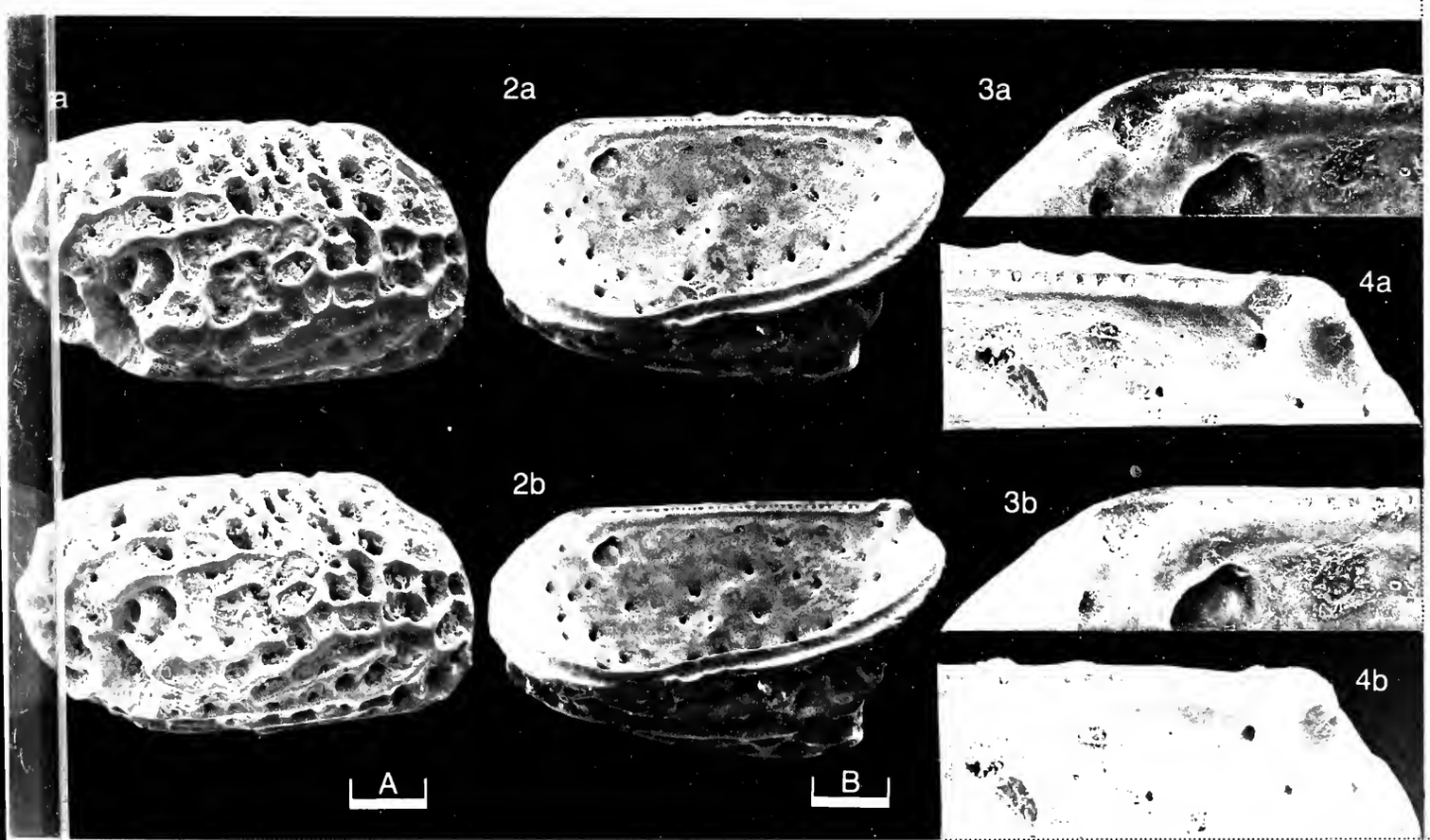
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ON *LOXOCORNICULUM MICROGRATELOUPIANUM* MAYBURY sp. nov.

by Caroline A. Maybury
(Institute of Earth Studies, University College of Wales, Aberystwyth)

Loxccorniculum micrograteloupianum sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS 13485**, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. **OS 13486–13489**.

Type locality: Fine glauconitic, grey sand between 26.7–32.5 m, Apigné (Borehole II), SW of Rennes (approx. lat. 48°07′N, long. 14°41′W), NW France; Upper Pliocene, Redonian.

Derivation of name: With reference to the fact that, while resembling *Loxocorniculum grateloupianum* (Bosquet, 1852) (see C. A. Maybury, *Stereo-Atlas of Ostracod Shells*, **17**, 65–68, 1990), the present species is notably smaller.

Figured specimens: British Museum (Nat. Hist.) nos. **OS 13485** (holotype, ♀ LV: Pl. **17**, 70, fig. 1), **OS 13486** (paratype, ♀ LV: Pl. **17**, 70, fig. 2), **OS 13487** (paratype, ♂ LV: Pl. **17**, 70, fig. 3), **OS 13488** (paratype, ♂ RV: Pl. **17**, 72, fig. 1), **OS 13489** (paratype, ♀ RV: Pl. **17**, 72, figs. 2, 3, 5). Specimens **OS 13489** and **OS 13488** from the type locality and horizon; specimens **OS 13486** and **OS 13487** from the shell-rich sand of Le Temple du Cerisier, SW of Rennes, NW France; Upper Pliocene, Redonian (see J.-P. Margerel, *Les Foraminifères du Redonien. Systématique, Répartition stratigraphique, Paléoécologie*, Nantes, **1**, 8–26, 1968 for further sample details).

Explanation of Plate 17, 70

Fig. 1, ♀ LV, ext. lat. (holotype, **OS 13485**, 550 μm long); fig. 2, ♀ RV, ext. lat. (paratype, **OS 13486**, 530 μm long); fig. 3, ♂ LV, ext. lat. (paratype, **OS 13487**, 600 μm long).
Scale A (200μm; ×109), figs. 1–3.

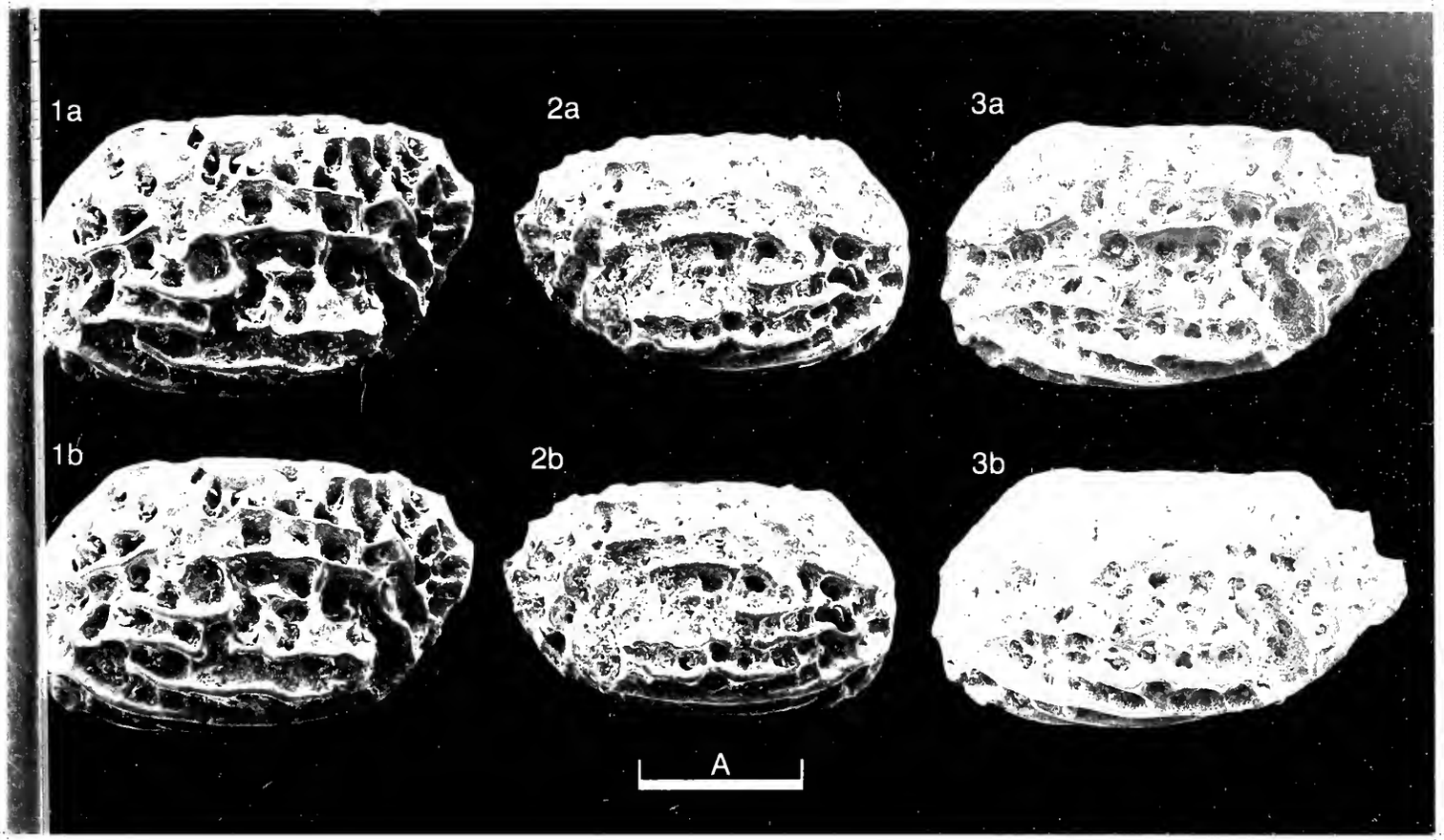
Diagnosis: A medium-sized (adults 520–600 μm long), dimorphic, alate *Loxocorniculum* with a rounded anterior margin and asymmetrically rounded posterior, possessing a subdorsal caudal process which is best developed in ♂ LV. The dorsal margin is straight to convex in females, oblique in ♂ LV and slightly concave medianly in ♂ RV. Ventral margin curved. Posterodorsal protuberance best developed in males. Ornament very coarsely reticulate with horizontal muri dominant and costate. Posteroventral incision well developed and smooth; eye tubercle small and ridge-like. Hinge similar to that of *L. grateloupianum* (see Maybury, 1990, *op. cit.*). Adductor muscle scars an oblique row of 4 with a 'c'-shaped frontal scar open dorsally, a narrow crescentic fulcral point and 1 (perhaps 2?) elongate mandibular scars.

Remarks: *L. micrograteloupianum* resembles *L. grateloupianum* in its coarse reticulation, smooth, pronounced posteroventral incisure and similar hinge structure (see Maybury, 1990, *op. cit.*). The two species differ in that *L. micrograteloupianum* possesses a posterodorsal protuberance, ridge-like, horizontal muri which are almost costate and a ridge-like eye tubercle and whereas, in *L. grateluopianum* the adductor muscle scars form a curved row, in *L. micrograteloupianum* they form an oblique row. The size difference between the new species and *L. grategloupianum* has already been emphasized.

Distribution: *L. micrograteloupianum* has been recovered from the Upper Pliocene, Redonian deposits of Apigné (Borehole II, Le Temple du Cerisier), Beugnon (Sample No. 3) and L'Aubier; NW France (see Margerel (1968, *op. cit.*) for geographical, stratigraphical and sample details).

Explanation of Plate 17, 72

Fig. 1, ♀ RV, ext. lat. (paratype, **OS 13488**, 590 μm long); figs. 2–4, ♀ RV (paratype, **OS 13489**, 560 μm long): fig. 2, int. lat.; fig. 3, ant. hinge element; fig. 4, post. hinge element.
Scale A (200 μm; ×109), figs. 1, 2; scale B (40 μm; ×273), figs. 3, 4.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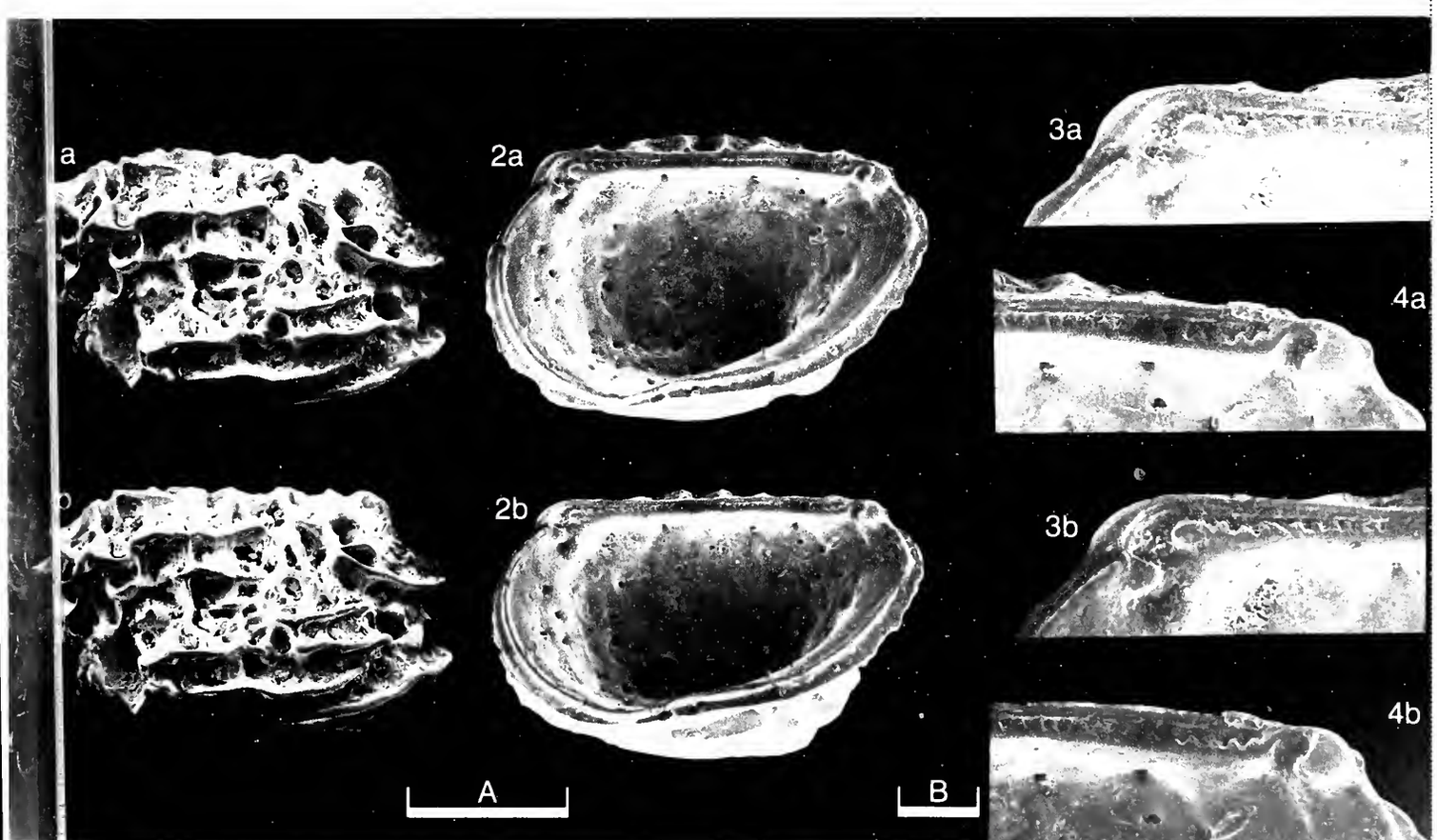
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ON *BROMIDELLA PAPILLATA* (HARRIS)

by C. Giles Miller, Mark Williams & Matthew I. Wakefield
(University of Leicester, England)

1957 *Eurychilina papillata* n. sp. R. W. Harris, *Bull. Okla geol. Surv.*, **55**, 232, pl. 7, figs. 9, 10a–b.

Holotype: Museum of Compatative Zoology, Harvard University (MCZ), U.S.A., no. **4626**; male carapace.

Type locality: From zone 3 (see Harris, 1957, *op. cit.*), Bromide Formation, Simpson Group, middle Ordovician, Rock Crossing section, Sec. 35, T. 5S., R.1E., Criner Hills, Oklahoma, U.S.A.; approximately latitude 34° 8′ N, longitude 97° 10′ W.

Figured specimens: Harvard Museum of Comparative Zoology, U.S.A. nos. **MCZ 4626**; (holotype, ♂ car.: Pl. **17**, 76, figs. 1–3) **MCZ 4626A**; (♀ RV: Pl. **17**, 74. figs. 1–4, Pl. **17**, 76, fig. 4). Both figured specimens are from the type locality in the Bromide Formation.

Diagnosis: Weakly bisulcate; S1 shallow and directed towards the anterocentral margin, S2 well defined and deepest slightly ventral of pre-adductorial node. Velum an entire well developed flange in both dimorphs, surmounted by closely spaced small tubercles. Both valves with well developed tuberculate admarginal ridge, absent in area of dolon in heteromorph.

Explanation of Plate 17, 74

Figs. 1–5, ♀ RV (**MCZ 4626A**, 1.7 mm long); fig. 1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, ext. vent.; fig. 4, int. lat.
Scale A (200 μm; ×35), figs. 1–4.

Remarks: The adventral, sulcal and dimorphic structures of *B. papillata* clearly distinguish it from *Eurychilina*.

B. papillata most closely resembles *Bromidella mattea* (Kraft) (see *Mem. geol. Socl Am.*, **86**, pl. 10, figs. 9–14, 1962) particularly with respect to heteromorph dolonal morphology. *B. papillata* appears to differ from *B. mattea* by having a less well developed preadductorial node and by having the velum surmount the dolon, whereas in the latter species the velum is expanded to form the dolon.

The heteromorph dolon of *B. papillata* is also very similar to that of *B. reticulata* (see M. Williams & D. J. Siveter, *Stereo-Atlas Ostracod Shells*, **16**, 1, 1989), but the heteromorph shows no evidence of the histial structure developed anteriorly in *B. reticulata*.

A node directly dorsal of the adductural sulcus can be observed in Harris' paratype specimen (**MCA 4626A**), this feature has not been observed in any other conspecific tecnomorph or heteromorph specimens.

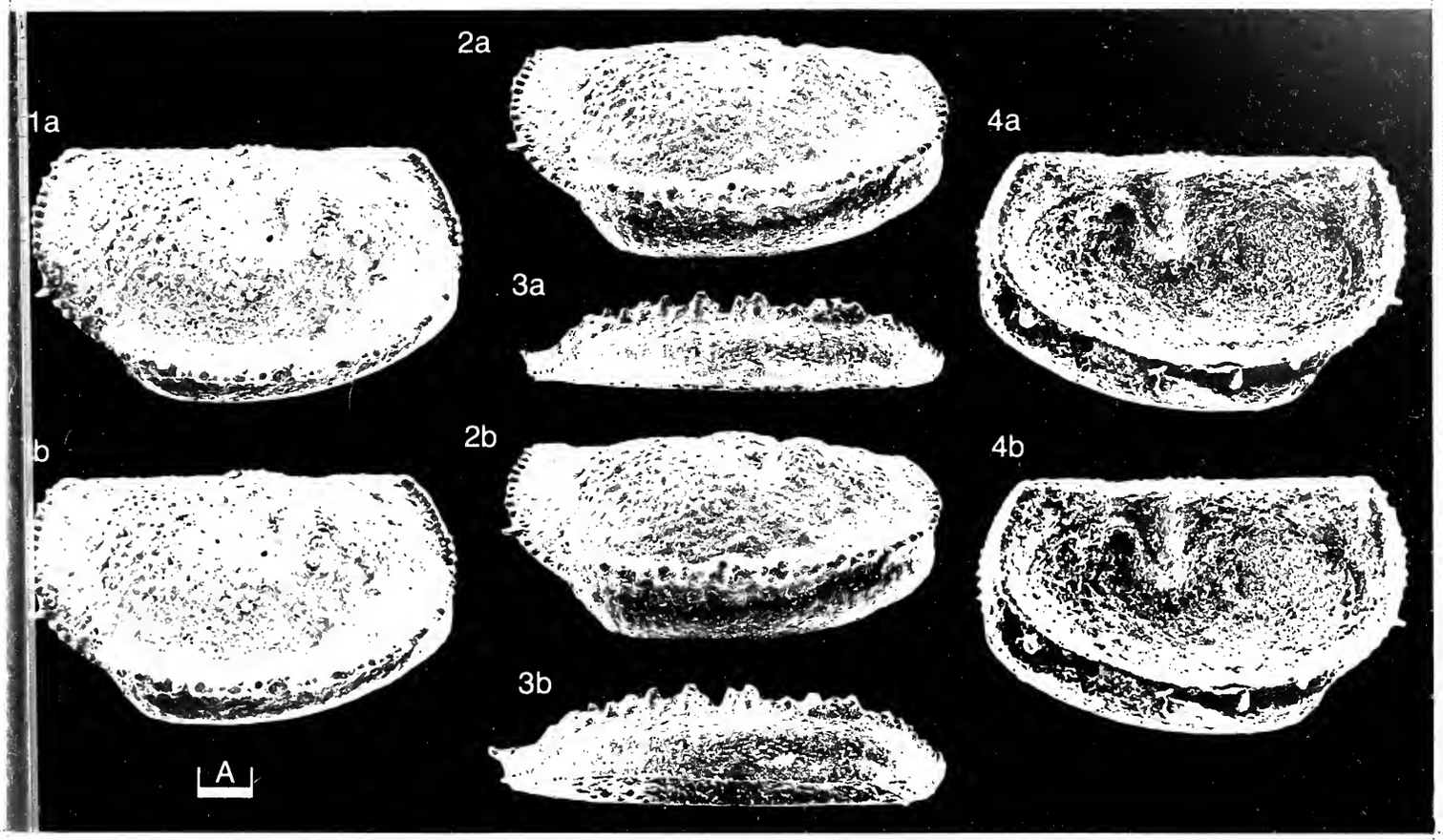
B. papillata occurs in the deeper water mid-shelf facies of the Bromide Formation (see M. Longman, *Univ. Kans. paleont. Contr.*, Monograph **1**, 1982).

Distribution: *B. papillata* is known from the Pooleville and Mountain Lake members of the Bromide Formation, middle Ordovician, Arbuckle Mountains and Criner Hills, Oklahoma, U.S.A.

Acknowledgements: Dr D. J. Siveter (University of Leicester) for helpful discussion, and Dr J. Berdan (Smithsonian Institution, Washington) for loan of the types.

Explanation of Plate 17, 76

Figs. 1–3, ♂ car. (holotype **MCZ 4626**, 1.6 mm long); fig. 1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, vent. Fig. 4, ♀ RV, anterior close-up detail of heteromorph dolon (**MCZ 4626A**, 1.7 mm long).
Scale A (200 μm; ×37), figs. 1–3; scale B (200 μm; ×90), fig. 4.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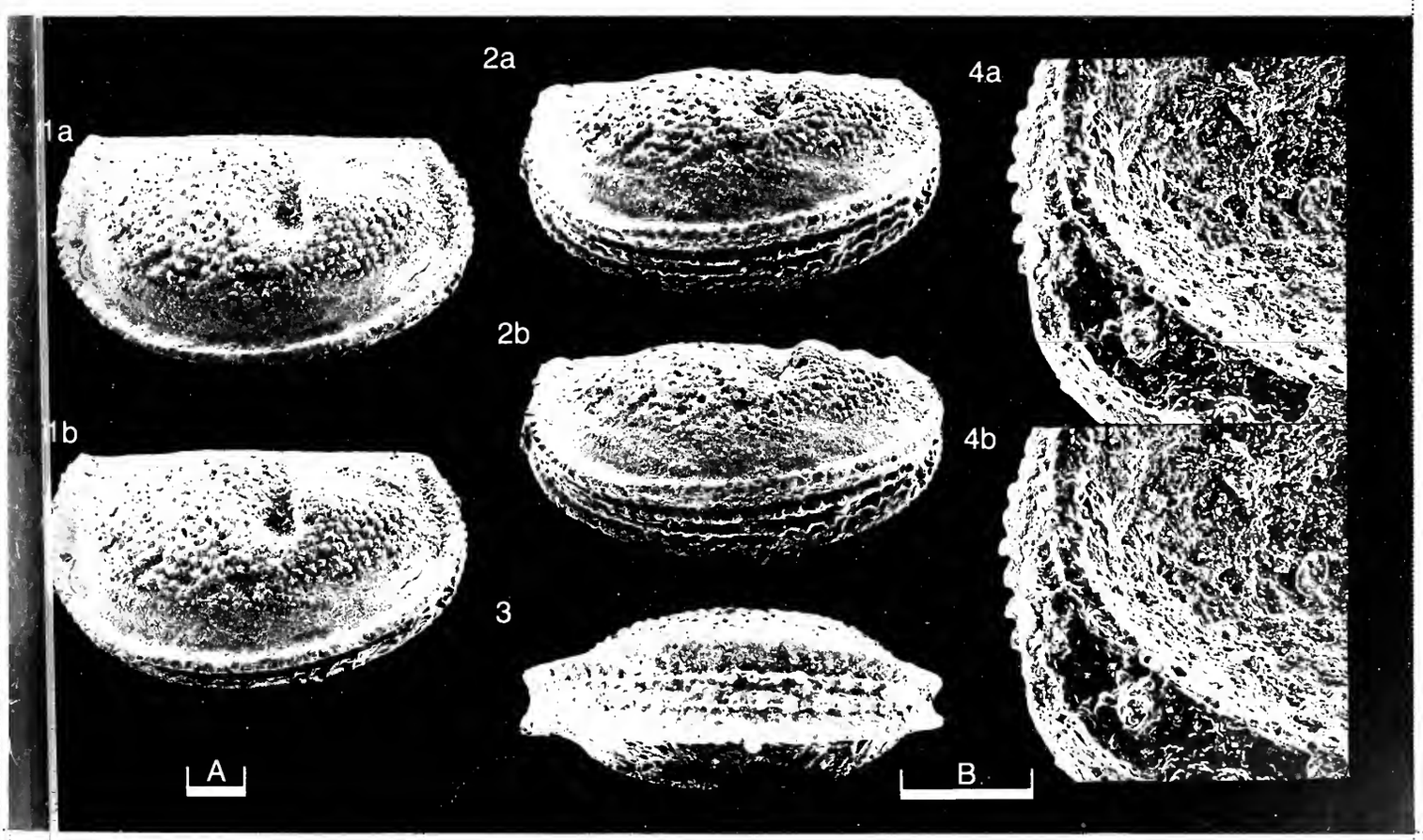
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Stereo-Atlas of Ostracod Shells: Vol. 17, Part 1

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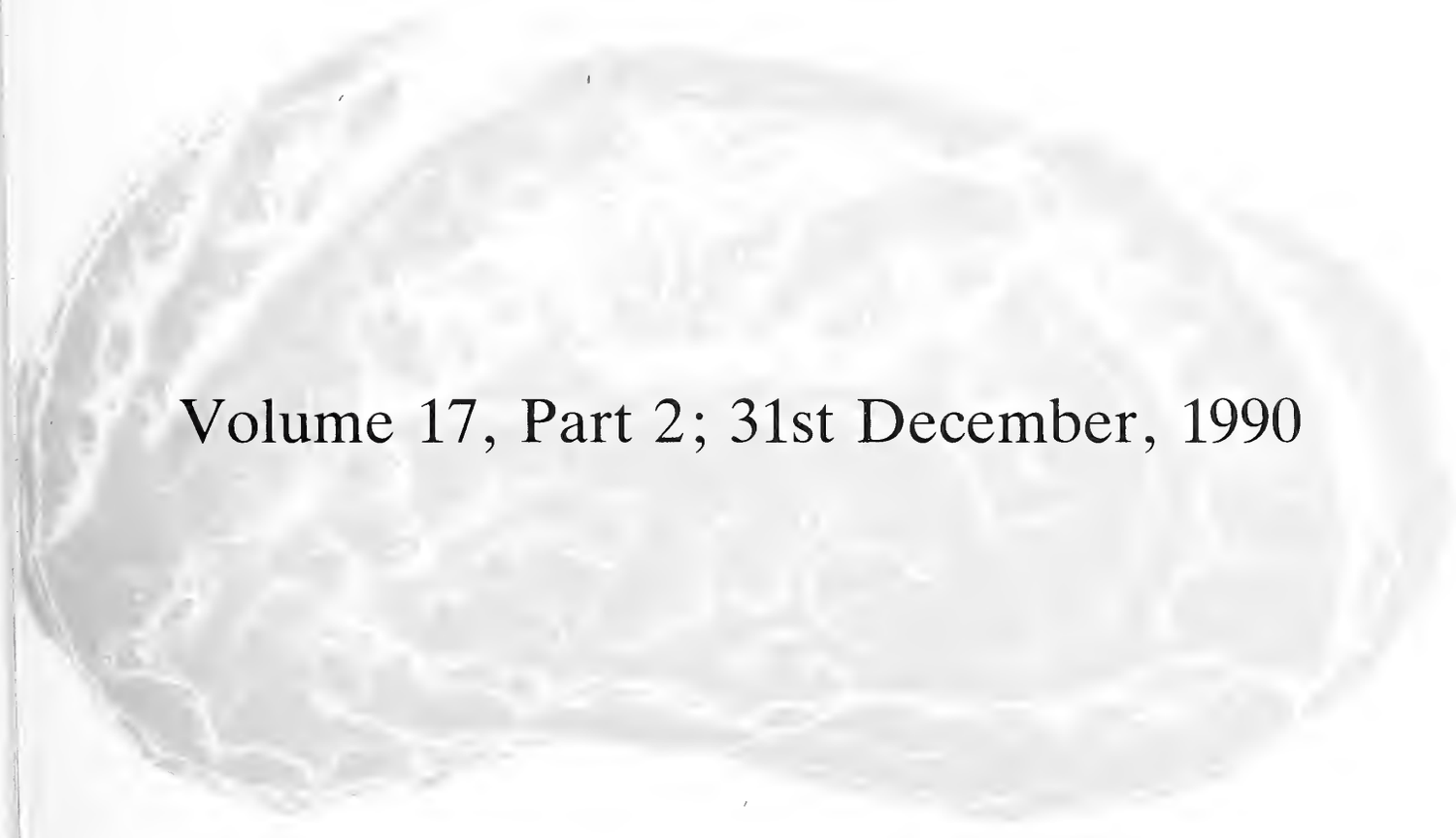
A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker



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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by only one page of text. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a male carapace (left side) of *Callistocythere murrayi* Whittaker from Mother Siller's Channel, Christchurch Harbour, Southern England; in brackish water. Photographed by J.E. Whittaker, British Museum (Natural History).

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595.337.14 (116.212) (420 : 162.003.50): 551.351+552.52

ON *GAMMACYTHERE KLINGLERI* BOOMER sp. nov.

by Ian Boomer
(University of East Anglia, Norwich, England

Gammacythere klingleri sp. nov.

1962 Ostracod Nr. 19, W. Klingler *in* W. Simon & H. Bartenstein (eds.), *Leitfossilien der Mikropaläontologie*, 94, pl. 13, fig. 29.

Holotype: British Museum (Natural History), London, **OS 13447**; ♂ RV.
[Paratypes nos. **OS 13440–13444**, **13446**, **13448**, **13449**]

Type locality: Dorset coast, S. England; Belemnite Marls, 3.6 m below Belemnite Stone, east of Westhay Water, Nat. Grid Ref. SY 3860 9250 (lat. 50° 37′ 30″ N, long. 2° 51′ 30″ W); *Uptonia jamesoni* Subzone, *Uptonia jamesoni* Zone, Lower Pliensbachian.

Derivation of name: In honour of W. Klingler, who first figured the species in open nomenclature.

Figured specimens: British Museum (Natural History) nos. **OS 13440** (♀ LV: Pl. **17**, 80, fig. 2), **OS 13441** (♂ LV: Pl. **17**, 78, fig. 2), **OS 13442** (♀ LV: Pl. **17**, 80, fig. 3), **OS 13443** (♀ LV: Pl. **17**, 78, fig. 5), **OS 13444** (♂ RV: Pl. **17**, 78, fig. 1), **OS 13446** (♀ RV: Pl. **17**, 80, fig. 5), **OS 13447** (holotype, ♂ RV: Pl. **17**, 78, fig. 3), **OS 13448** (♂ LV: Pl. **17**, 80, fig. 1), **OS 13449** (♀ car.: Pl. **17**, 80, fig. 4), lost specimen (♀ RV: Pl. **17**, 78, fig. 4).
All figured specimens from type locality and horizon.

Explanation of Plate 17, 78

Fig. 1, ♂ RV, ext. lat. (**OS 13444**, 545 μm long); fig. 2, ♂ LV, ext. lat. (**OS 13441**, 654 μm long); fig. 3, ♂ RV, ext. lat. (holotype, **OS 13447**, 600 μm long); fig. 4. ♀ RV, ext. lat. (lost specimen, 576 μm long); fig. 5, ♀ LV, ext. lat. (**OS 13443**, 545 μm long).
Scale A (100 μm; ×92), figs. 1–5.

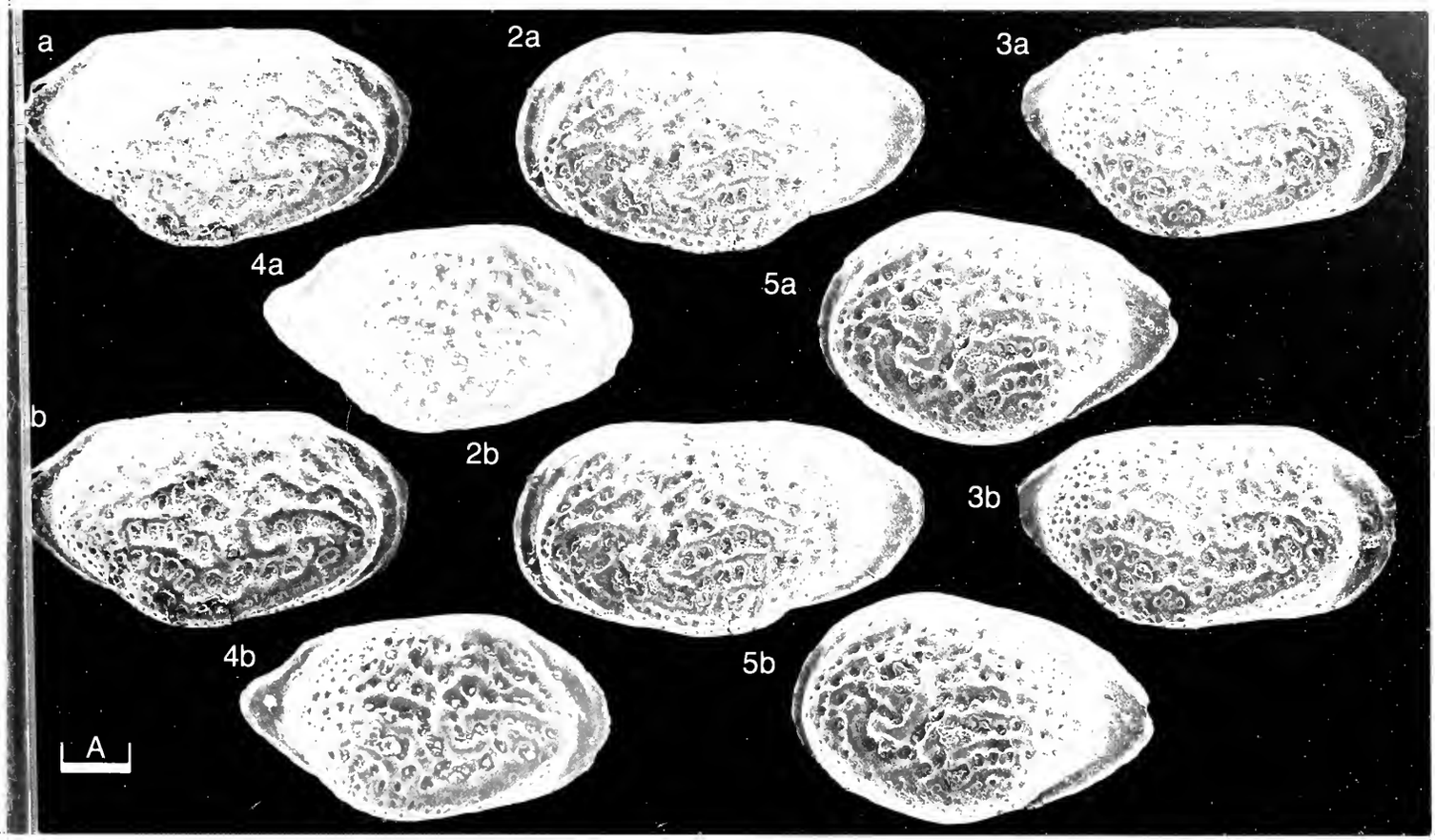
Diagnosis: A species of *Gammacythere* with a distinct posteroventral swelling. Ornament coarse, consisting of irregular pitting and ribbing with little or no alignment. Dimorphic. Carapace elongate-ovate, more so in males, dorsal margin straight in RV and sinuous in LV. Ventral margin sinuous with concavity in front of mid-length. Anterior and posterior margins laterally compressed, the former broadly rounded and the latter acuminate. Greatest height at anterior cardinal angle; greatest length running obliquely from posterior extremity to a point below mid-height on anterior margin; greatest width behind mid-length. Ventro-lateral margin strongly inflated, especially posteriorly. Lateral ornament coarse in the mid-valve region, becoming much weaker marginally. Dorso-median sulcus present. Internal details and marginal structures as for genus.

Remarks: *Kinkelinella foveolata* Michelsen (*Danm. Geol. Unders.*, **104**, 189, 1975), considered here to belong to the genus *Gammacythere*, is similar in size but differs from *G. klingleri* in that it lacks the posteroventral swelling. *G. ubiquita* Malz & Lord (*Senckenberg. leth.*, **57**, 252, pl. 1, figs. 1–6, pl. 2, figs. 7–19, 1976), the type species, is larger (♀ carapace 530–810 μm long, ♂ 700–900 μm long) and more weakly ornamented than *G. klingleri*. Malz & Lord (*op. cit.*, 256) consider Ostracode E of Apostolescu (*Revue Inst. fr. Pétrole*, **14**, 817, 1959) also belongs to this genus.

Distribution: Early Pliensbachian, Lower Jurassic; *jamesoni* – lower *ibex* zones of Hamburen WA 2 borehole, N. Germany (Klingler, *op. cit.*, 1962) and upper *jamesoni* – *ibex* zones of the Dorset coast (herein). The stratigraphic range of *G. klingleri* overlaps with that of *G. foveolata* (Michelsen) in the upper *jamesoni* Zone, and with *G. ubiquita* Malz & Lord in the upper *ibex* Zone.

Explanation of Plate 17, 80

Fig. 1, ♂ LV, int. lat. (**OS 13448**, 600 μm long); fig. 2, ♀ LV, ext. lat. (**OS 13440**, 564 μm long); fig. 3, ♀ LV, int. lat. (**OS 13442**, 509 μm long); fig. 4, ♀ car., dors. (**OS 13449**, 527 μm long); fig. 5, ♀ RV, int. lat. (**OS 13446**, 491 μm long).
Scale A (100 μm; ×92), figs. 1–5.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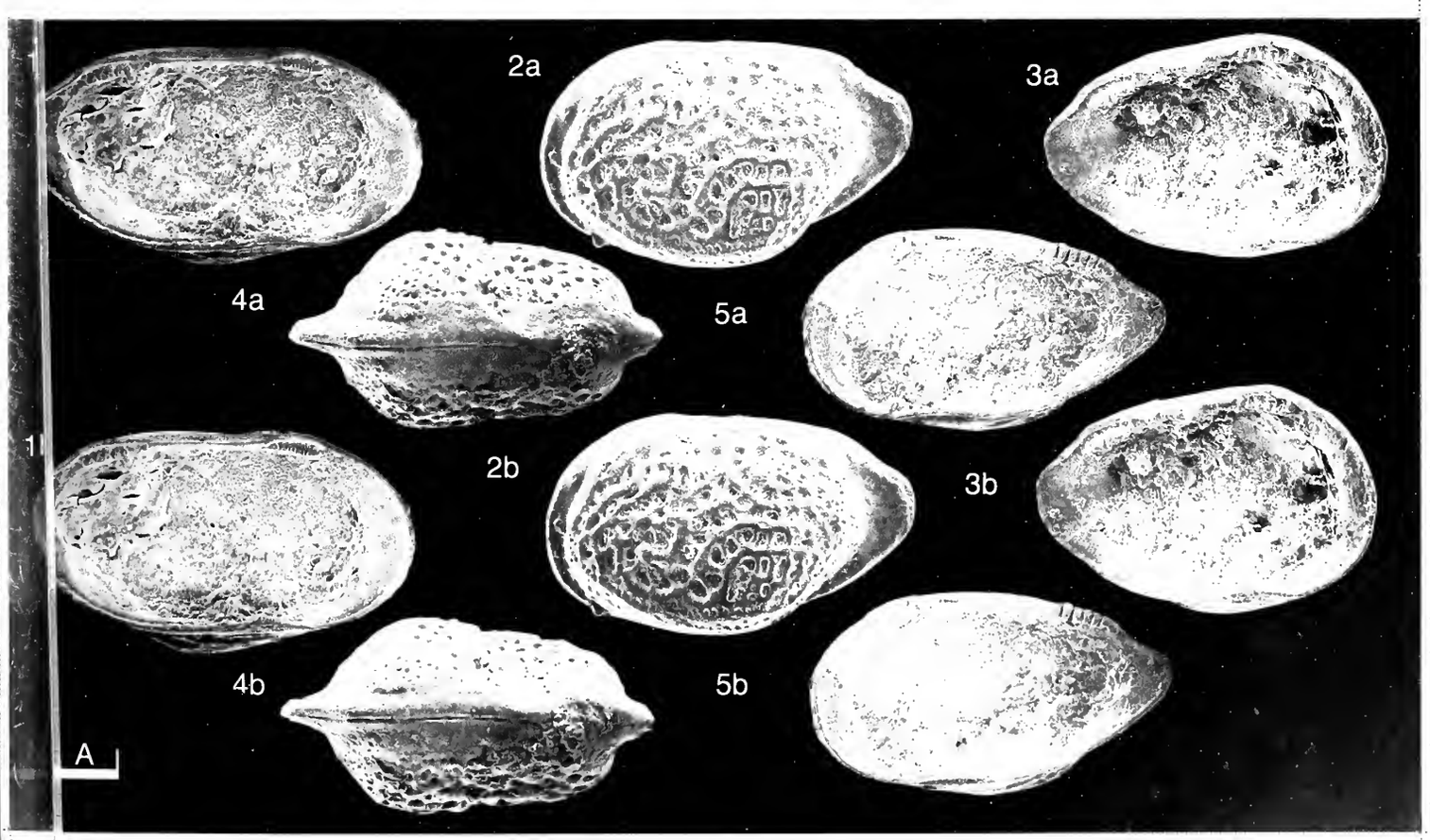
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595.336.13 (113.312) (57 : 161.171.66 + 161.140.68): 551.351

ON *BOLBINELLA CUMULATA* KANYGIN

by Roger E. L. Schallreuter & Aleksandr V. Kanygin
(University of Hamburg, Germany & USSR Academy of Sciences, Siberian Branch, Novosibirsk)

Genus *BOLBINELLA* Kanygin, 1967
Type-species (by original designation): *Bolbinella cumulata* Kanygin, 1967

Diagnosis: Median-sized to large Nodambichilinae (Tvaerenellidae, Hollinacea). Lobes appear as two broad rounded or dorsally conical bulbs, one on each side of deep, funnel-sulcus. At the posterior base of the anterior lobe a weak preadductorial node may occur. Lobes joined ventrally by a more or less distinct connecting ('zygal') lobe. Velum appears ventrally as a thick keel (tecnomorphs) or broad flange (females), presumably forming a long dolonal antrum; laterovelar furrow correspondingly shallower in females. Marginal sculpture: a row of spines. Surface smooth, punctate or reticulate.

Remarks: In spite of the fact that *Bolbinella* was named by Kanygin (*Ostrakody ordovika gornoj sistemy Cherskogo*, 100, 1967), because of its similarity to *Bolbina* the genus was originally placed within the Billinae (*recte* Bolliinae). The antral dimorphism demonstrated herein in the type-species of *Bolbinella* indicates that the genus is probably related to the tvaerenellid genus *Bolbina* and therefore to the subfamily Nodambichilinae Schallreuter, 1967 (*Geologie*, **16**, 931). This subfamily is characterized by two lobes (spines, bulbs) at the dorsal margin and is known from both N. America and Baltoscandia.

Explanation of Plate 17, 82

Fig. 1, ♀ RV, ext. lat. (**IGiG 256/46g**, 1.98 mm long); fig. 2, anteroventrally incomplete ♀ LV (**IGiG 256/46d**, 1.95 mm long); fig. 3, tecnomorphic RV, ext. vent. (**IGiG 258/20b**, 1.92 mm long).
Scale A (250 μm; ×44), figs. 1, 2; scale B (250 μm; ×29), fig. 3.

Bolbinella cumulata Kanygin, 1967

1967 *Bolbinella cumulata* A. V. Kanygin gen. et sp. nov., *Ostrakody ordovika gornoj sistemy Cherskogo*, 100–102, 103, 121, pl. 20, figs. 1–4a, table 2 (118), 152 [*B. cumilata* (error)].
1975 *Bolbinella cumulata* Kanygin; A. V. Kanygin, *in* Yu. I. Tesakov, *et al.*, *Trudy Inst. Geol. Geofiz. sib. Otd.*, **200**, 246.
1977 *Bolbinella cumulata* Kanygin; M. M. Oradovskaja & A. M. Obut, *Trudy Inst. Geol. Geofiz. sib. Otd.*, **351**, 15.
1977 *Bolbinella cumulata* Kanygin; A. V. Kanygin, *Trudy Inst. Geol. Geofiz. sib. Otd.*, **351**, 83, 85, pl. 2, fig. 11.

Holotype: Institute of Geology and Geophysics, Siberian Branch of the Academy of Sciences of the USSR, Novosibirsk (**IGiG**), no. **256/46a;** LV.

Type locality: Selennyaskij Kryazh (*nec* Omulevskie gory), ruch. Kalychan, Siberia, USSR (= loc. 766 of Kanygin, 1967, fig. 2), long. 140° 30′ E, lat 68° 44′ ; Kalychanskian Formation, middle Ordovician.

Figured specimens: **IGiG** nos. **256/46g** (♀ RV: Pl. **17**, 82, fig. 1), **256/46d** (♀ LV: Pl. **17**, 82, fig. 2), **256/46e** (tecnomorphic RV: Pl. **17**, 84, fig. 1), **256/46v** (tecnomorphic RV: Pl. **17**, 84, fig. 2), **258/20b** (tecnomorphic RV: Pl. **17**, 82, fig. 3) and **258/20** (tecnomorphic RV: Pl. **17**, 84, fig. 3). Nos. **256/46v–e** are from the type locality; nos. **258/20** and **258/20b** are from Chukotka (= loc. 6836 of Kanygin, 1977, *op. cit.*; long. 171° 17′ E, lat. 66° 35′ N). All specimens occur on rock pieces.

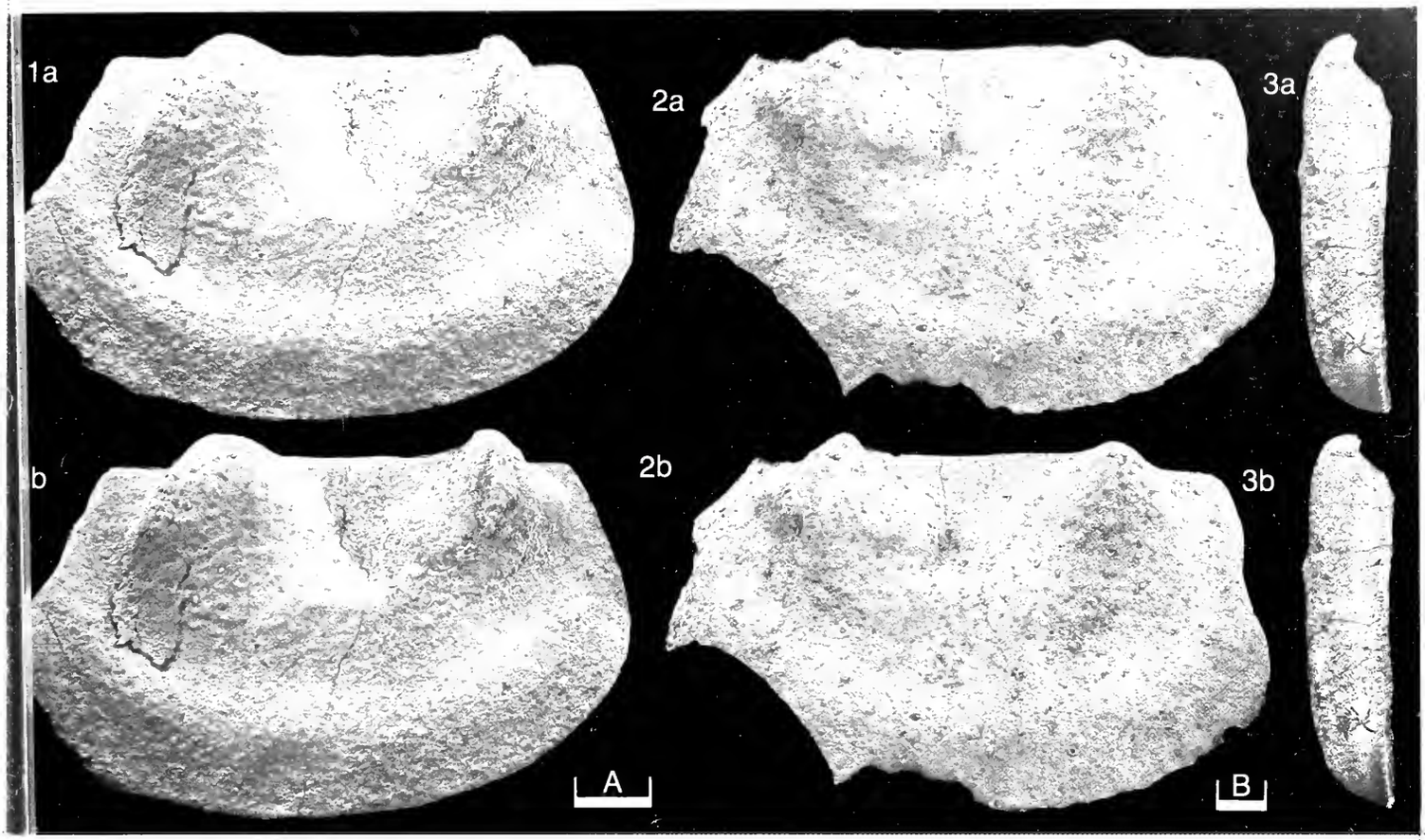
Diagnosis: Species of *Bolbinella* with length up to 2.34 mm. Dorsal lobes more or less conical. Relatively distinct preadductorial node. Connecting lobal ('zygal') sculpture flat and relatively indistinct. A small, flat node-like sculpture in anterodorsal corner field. Punctate to reticulate.

Remarks: The older (lower Ordovician) *B. lecta* Kanygin, 1967 (*op. cit.*, 122) is smaller (*c.* 1.8 mm long), the lobes are more rounded and the preadductorial node is very weak or missing. Furthermore, its connecting lobe is more distinct and its surface is smooth.

Distribution: Known only from Siberia: from the type locality and also from the Chukotka Peninsula (Issehtehnskian Formation), from Sette-Daban (Labystanskian Formation) and from the Kulyumbeh river in the Siberian platform (*Bodenia aspera* Zone). All middle Ordovician (for details see papers by Kanygin in synonomy list).

Explanation of Plate 17, 84

Fig. 1, tecnomorphic RV, ext. lat. (**IGiG 256/46e**, 1.71 mm long); fig. 2, tecnomorphic RV, ext. lat. (**IGiG 256/46v**, 1.74 mm long); fig. 3, tecnomorphic RV, ext. lat. (**IGiG 258/20**, 1.95 mm).
Scale A (250 μm; ×46), figs. 1, 2; scale B (250 μm; ×26), fig. 3.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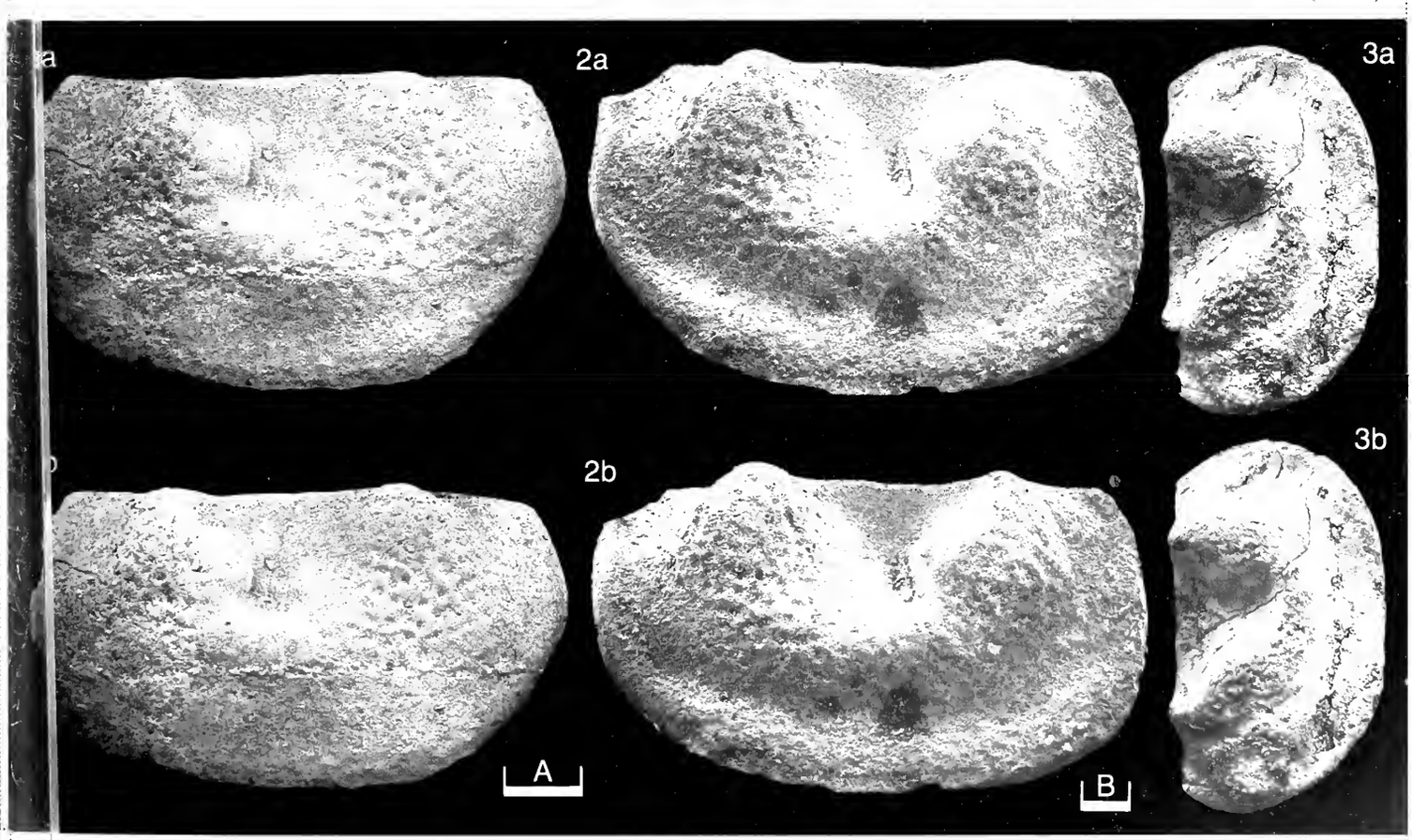
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595.33.330 (113.312) (57 : 161.171.66): 551.351

ON *CHEGETELLA CHEGITUNICA* KANYGIN

by Ingelore C. U. Hinz, Aleksandr V. Kanygin & Roger E.L. Schallreuter
(University of Bonn, Germany, & USSR Academy of Sciences, Siberian Branch, Novosibirsk & University of Hamburg, Germany)

Genus *CHEGETELLA* Kanygin, 1977

Type-species (by original designation): *Chegetella chegitunica* Kanygin, 1977

Diagnosis: Large bradoriid; postplete with retral swing. Hinge-line straight. A more or less distinct sulcal depression may occur in mid-dorsal region dorsal of base of spine. Long, posteriorly curved spine in midventral posterior region, interrupting sharp ridge which starts and terminates in the cardinal corner fields and in lateral view approximately parallels lateral border anteriorly and diverges from the free margin posteriorly; anteriorly in ventral view it diverges gradually from the free margin. A second, keel-like, marginal ridge occurs parallel to free margin. Area between ridges is steeper anteroventrally than posteroventrally. Surface finely and sparsely punctate.

Remarks: *Chegetella* was originally was placed within the Aparchitacea, suborder Leperditiida (Kanygin 1977, 73). However after seeing the original material, Schallreuter considered that *Chegetella* is a bradoriid. This idea was also acknowledged by Hinz, also after investigation of the type-material. Its bradoriid features include: its relatively large size; its retral swing; and, instead of a proper sulcation and lobation (except spine), the occurrence and form of its lateral ridge; as well as the apparently very thin, black shell.

Lateral and marginal ridges in bradoriids are known; for example from *Ophiosema* Öpik, 1968 *(Bull. Bur. Miner. Resour. Geol. Geophys. Aust.*, **103,** pl.3, figs. 1-2) and *Auriculatella* Tan, 1980 (see S. Huo, & D. Shu, *Cambrian Bradoriida of South China, Beijing,* pl. 24, 1985). Ventral spines have been described from the bradoriid *Spinokunmingella* Huo & Shu, 1985 *(op. cit.*, text-figs. 8-30,31,pl. 13, figs.1-10). The 'knotty'

Explanation of Plate 17, 86

Fig. 1,3, LV (holotype, **IGiG 258/3a,** 3.5 mm long): fig. 1, ext. lat.; fig 3, ext. vent. Fig. 2, fragmentary RV (**IGiG 258/3v**, length of spine 1.56 mm). Scale A (500 μm; ×28), fig. 1; scale B (500 μm; ×25), fig. 2; scale C (500 μm; ×21), fig. 3.

surface of the figured steinkern of *Chegetella* (Pl. **17**, 88, fig. 3) may indicate an original adornment by minute spines similar to the long dorsal spines of *Monasterium* Fleming, 1973 (*Pubs. geol. Surv. Qd*, **356,** *Palaeont. Pap.* **31,** pl. 4, fig. 5).

Ordovician bradoriids are poorly known. They include *Eremos* Moberg & Segerberg, 1906 from the Tremadocian of Sweden (see *Treatise on Invertebrate Paleont.*, part Q, Q102, 1961), *Septadella* Stubblefield, 1933 (*Q.Jl Geol. Soc. Lond.*, **89,** 371) from the Tremadocian of England, *Ludvigsenites* Copeland, 1964 *(Bull. geol. Surv. Can.* **244**, 13) from the middle Ordovican of the SW District of MacKenzie, Canada and *Zhexiella, Preaechmina* and *Polycostalis* Shu, 1990 from China *(Cambrian and Lower Ordovician Bradoriida from Zhejiang, Hunan and Shaanxi Provinces,* 44, 63). *Ludvigsenites* is stratigraphically and geographically the nearest to *Chegetella* but distinctly differs in many features; however, the size and colour of shell are similar in both genera.

Chegetella chegitunica Kanygin, 1977

1977 *Chegetella chegitunica* [and (in error) *chegetunica*] gen. et sp. nov., A. V. Kanygin, *Trudy Inst. Geol. Geofiz. sib. Otd.*, **351,** 73–75, 194, 195, pl. 3, figs. 4, 5.

Holotype: Institute of Geology and Geophysics, Siberian Branch of the Academy of Sciences of the USSR **(IGiG)**, Novosibirsk, no. **258/3a** (*non* **258/1b**); LV.

Type locality: Chukotka Peninsula, Putukunehj Mountains, USSR, [loc. 6814 (*non* 6819) of Kanygin 1977], long. 171°24′E, lat 66°30′ N; Issehtehnskian Formation, lower part of Kharkindzhinskian horizon, middle Ordovician.

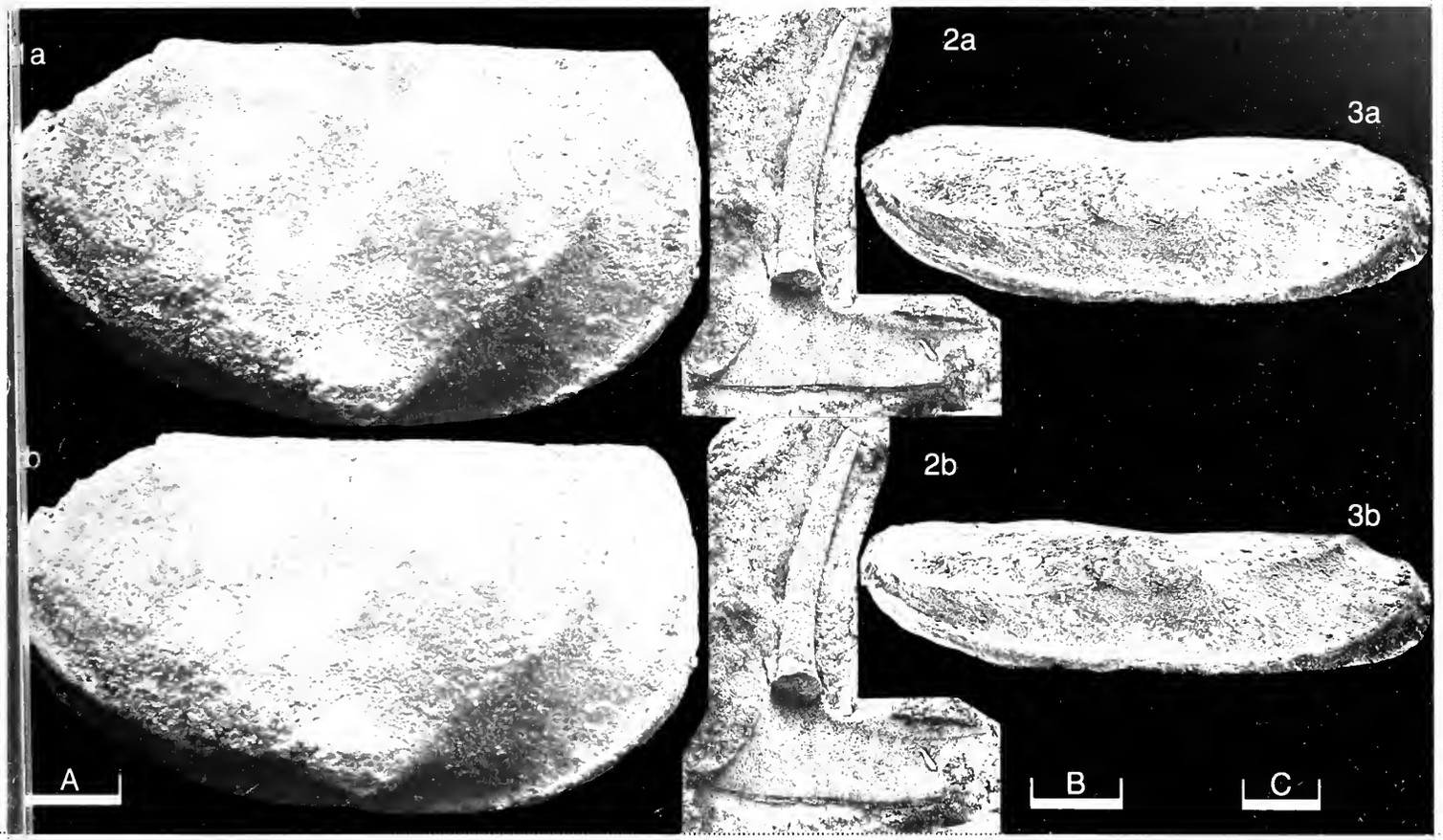
Figured specimens: **IGiG** nos. **258/3a** (holotype; LV: Pl. **17**, 86, figs. 1, 3), **258/3b** (compressed LV: Pl. **17**,88 fig. 1), **258/3v** (fragmentary RV: Pl. **17**, 86, fig. 2), **258/3g** (fragmentary LV: Pl. **17**, 88, fig. 2), and **258/3d** (incomplete LV: Pl. **17,** 88, fig. 3). Nos. **258/3a–b** are from the type locality; nos. **258/3v, g, d** are from locality no. 6819 (same region) of Kanygin 1977.

Diagnosis: Up to 3.5 mm long. In other respects as for the genus. *Chegetella* is currently monotypic.

Distribution: Known only from two middle Ordovician localities (6814, 6819) of the type region, Siberia, USSR (Kanygin, 1977).

Explanation of Plate 17, 88

Fig. 1, laterally compressed LV, ext. lat. (stereo tilt=20°) (**IGiG 258/3b,** 2.9 mm long); fig. 2, fragmentary LV, ext. lat. (**IGiG 258/3g,** 1.28 mm long); fig. 3, incomplete LV, ext. lat. (**IGiG 258/3d,** 1.95 mm high);
Scale A (500 μm; ×25), fig. 1; scale B (250 μm; ×50), fig. 2; scale C (500 μm; ×22), fig. 3.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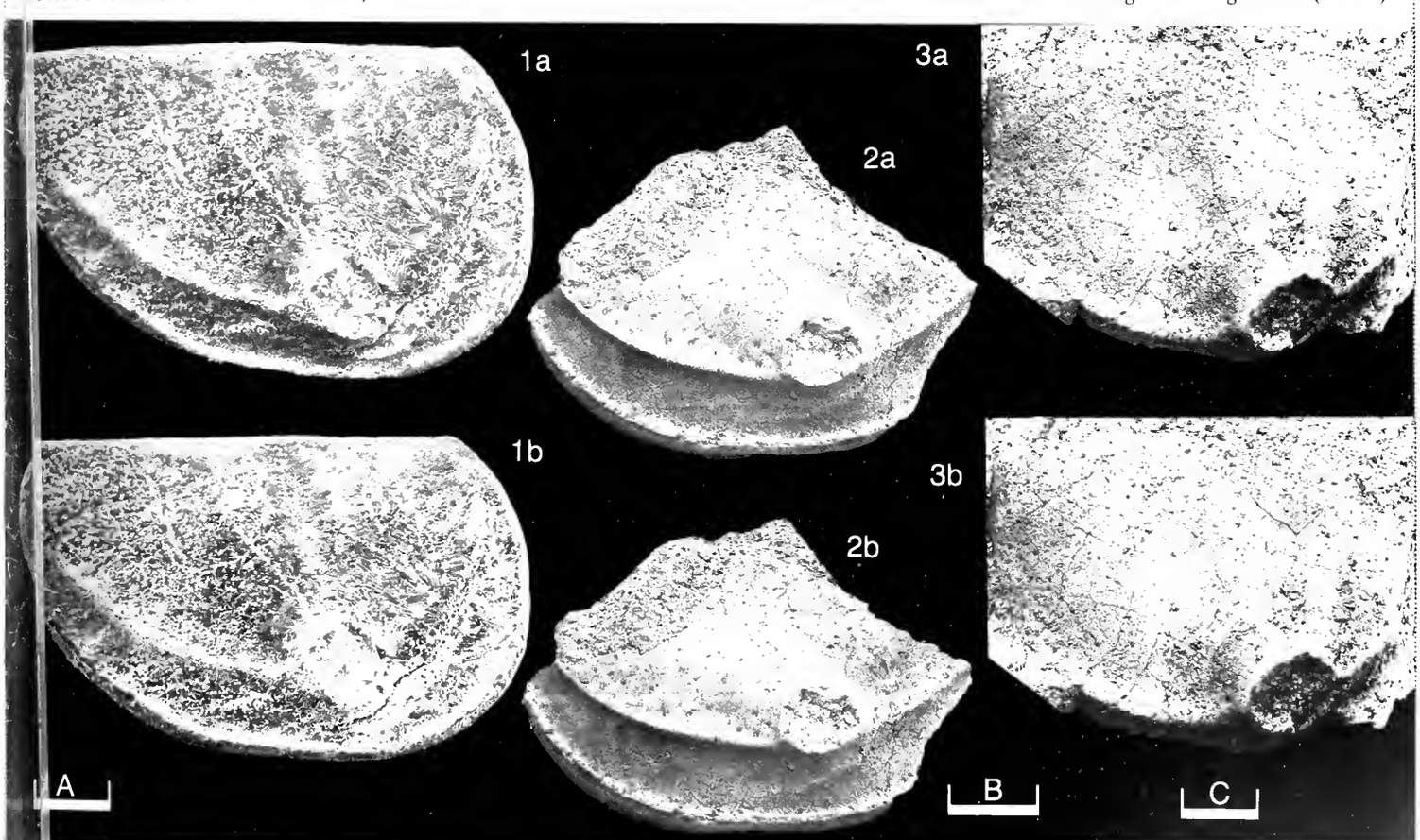
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C

595.33 (113.313) (437 : 161.014.50+485 : 161.013.56): 551.351+552.52

ON *SCANIPISTHIA RECTANGULARIS* (TROEDSSON)

by Roger E.L. Schallreuter & Miroslav Krůta
(University of Hamburg, Germany & Czechoslovakian Academy of Sciences, Prague)

Genus *SCANIPISTHIA* gen. nov.
Type-species : *Jonesina rectangularis* Troedsson, 1918

Derivation of name: After Scania, Sweden and because of the possible affinity of the genus to the Lomatopisthiidae. Gender, feminine.

Diagnosis: Small, elongate lomatopisthiid?; rounded–rectangular outline. In front and behind adductorial sulcus (S2) are two rounded or elongate nodes. Ventrally of the nodes there is an elongate, broad ridge–like lobal feature parallel to the ventral margin. Parallel to the entire free margin occurs a broad, rounded ridge–like 'adventral' elevation which is separated from the valve lateral surface by a U-shaped furrow.

Remarks: The typical members of the lomatopisthiids (ostracod suborder uncertain) are characterized by a special kind of domiciliar dimorphism (lomatopisthiid dimorphism; see A.L. Guber, & V. Jaanusson, *Bull. geol. Instn Univ. Uppsala,* **43,** 1–19, 1964). Because this type of dimorphism cannot presently be shown to occur in *Scanipisthia,* its assignment to the Lomatopisthidae is uncertain. It would represent the second genus of lomatopisthiids known from Europe, the first being *Europisthia* Schallreuter *(Neues Jb. Geol. Paläont. Mh.,* **1978** (3), 175, figs. 1, 2). *Europisthia* differs most notably in lacking any dorsal nodes or a lateral lobe-like ridge. The taxon *Scanipisthia* is formally erected herein; the name previously featured (as *nomina nuda*) in faunal logs (see synonymy below).

Explanation of Plate 17, 90

Fig. 1, RV ext. lat. (cast **[GPIMH 3236]** of lectotype, 0.76 mm long); fig. 2, RV ext. lat. (**NMP L38872b,** 0.58 mm long). Scale A (50µm; ×116), fig. 1; scale B (50µm; ×165), fig. 2.

Scanipisthia rectangularis (Troedsson, 1918)

1918 *Jonesina rectangularis* n. sp., G.T. Troedsson, *Acta Univ. lund, N.F.,* (2), **15**(3), 56, 57, 95, fig. 9.
1934 *Jonesina rectangularis* Troedsson; R.S. Bassler & B. Kellett, *Spec. Pap. geol. Soc. Am.,***1,** 72, 347.
1969 *Bollia mezmalensis* Gailite; L. Gailite, *Stratigraphy of the Baltic Lower Paleozoic and its Correlation with other Areas,* 132, Vilnius.
1970 *Bollia mezmalensis* Gailite, sp. n. (*sic*), L. Gailite, *Paleontologiya i Stratigraphiya Pribaltiki i Belorussii,* 2, 24, pl. 1, fig. 5, Vilnius.
1982 *Bollia mezmalensis* Gailite; L. Gailite *in* R. Ulst, L.K. Gailite, & V.I. Jakovleva, *Ordovician of Latvia,* 132, tab. 8(121), Riga (Zinatne).
1985 *Bollia mezmalensis* Gailite; J. Sztejn, *Biul. Inst. geol.,* **15,** 72, tab. 1, pl. 4, fig. 7.
1985 *Scanipisthia rectangularis*; H.P. Schönlaub, *Arbeitstag. geol. Bundesanstalt, Wien,* **1985** (3), 66, figs. 25a–d (log) ; = *nom. nud.*
1988 *Scanipisthia rectangularis* (Troedsson); H.P. Schönlaub, *Bull. Brit. Mus. nat. Hist.* (Geol.), **43,** 109; = *nom. nud.*
1988 *Scanipisthia rectangularis*; R.E.L. Schallreuter & M. Krůta, *Mitt. geol.-paläont. Inst. Univ. Hamburg,* **67,** 100, 105; = *nom. nud.*

Lectotype: Department of Historical Geology & Palaeontology, Geological Institute, University of Lund (**LM**), Sweden no. **L02909t**; external mould of a right valve. On the other side of the same piece of rock is another, conspecific external mould of a right valve and one of *Harpabollia harparum.* [Paralectotype: University of Lund, **L02908T**].

Type locality: Röstånga, Scania, Sweden, 56°00′N, 13°14′E. Brachiopodskiffer ('Brachiopod shale' = *Dalmanitina* beds), Ashgill Series, upper Ordovician.

Figured specimens: Geological–Palaeontological Institute and Museum, University of Hamburg (**GPIMH**) no. **3236** (= cast of lectotype (**LM**) no. **L02909t,** RV: P1. **17,** 90, fig. 1). National Museum, Prague (**NMP**) nos. **L38872b** (RV: P1. **17,** 90, fig. 2), **L38872a** (LV: P1. **17,** 92, fig. 1), **L38873** (LV: P1. 17, **92,** fig. 2); these three Bohemian specimens are from the Králův Dvůr Formation at Jezerka, Prague, 50°5.5′N, 14°28.5′E.

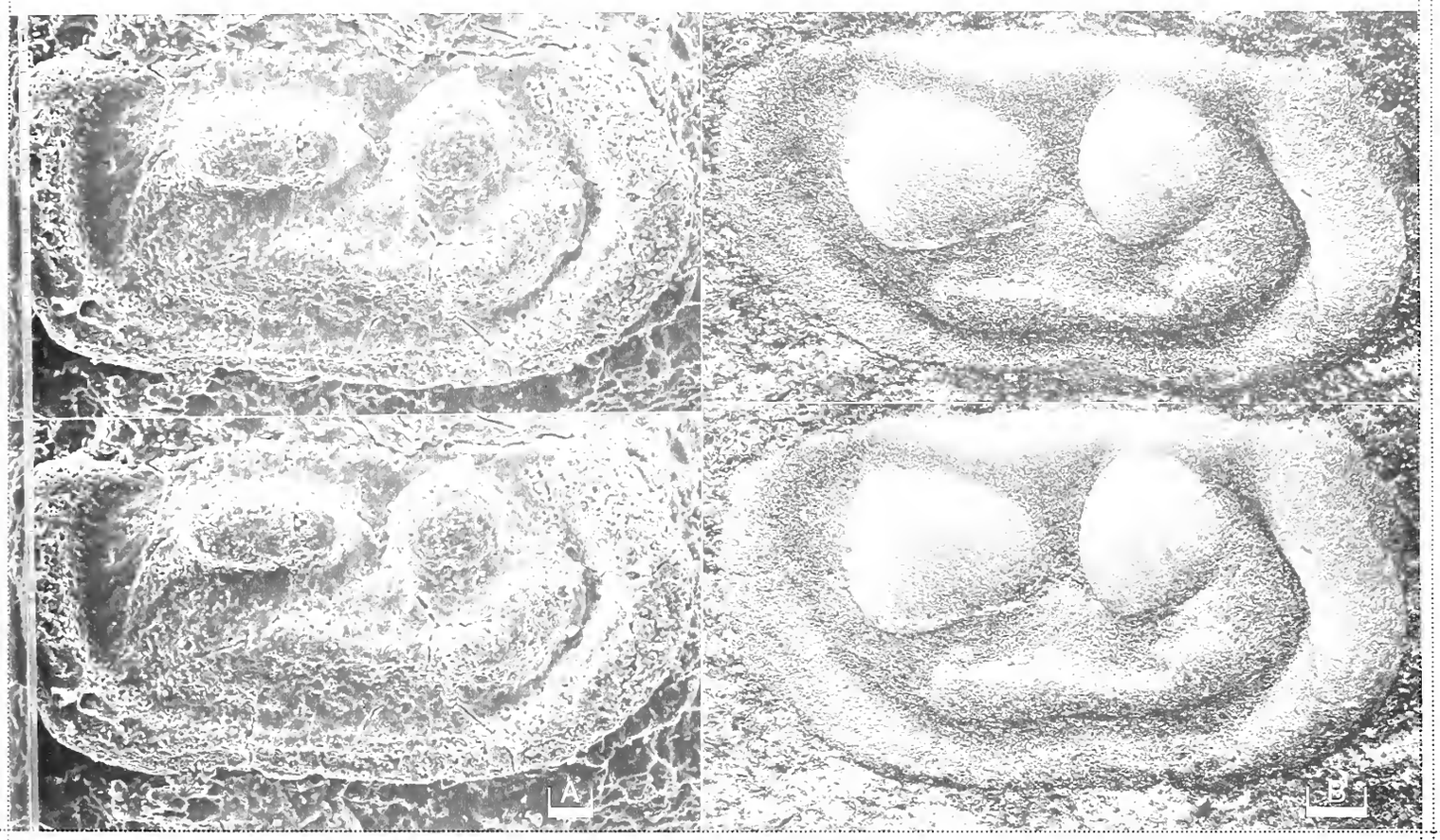
Diagnosis: As for the genus.

Remarks: Both the Bohemian and the Scandanavian material is preserved in soft shales. In order to study the external moulds casting with 'Silcoset' was used. Troedsson's original type material consists of three specimens; from Bohemia five specimens are available. It is, therefore possible that adults are not represented in the available material.

Distribution: Scania (Troedsson 1918), Latvia (W facies zone; Gailite 1970, 1982, 1985) NE Poland (S. East Prussia; Sztejn 1958), Bohemia (herein) and the Carnic Alps (Schönlaub 1985, 1988). All upper Ordovician.

Explanation of Plate 17, 92

Fig. 1, LV, ext. lat. (**NMP L38872a,** 0.68 mm long); fig. 2, LV, ext. lat. (**NMP L38873,** 0.68 mm long). Scale A (50 µm; x140), figs. 1, 2.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595.336.12 (113.311) (948 : 163.133.25) : 551.351+552.54

ON *PILLA LATOLOBATA* JONES & SCHALLREUTER sp. nov.

by Peter J. Jones & Roger E. L. Schallreuter
(Bureau of Mineral Resources, Canberra, Australia & University of Hamburg, Germany)

Pilla latolobata sp. nov.

1985 Bolliidae gen. et sp.; P. J. Jones, *In: Bureau of Mineral Resources Yearbook*, Canberra, 57.

Holotype: Bureau of Mineral Resources, Canberra, Australia; Commonwealth Palaeontological Collection (**CPC**) no. **29094**; LV.
[Paratypes: **CPC 29095–29101**].

Type locality: Maloney Greek, about 20 m E of the Stuart Highway, 120 km SW of Alice Springs, Amadeus Basin, Northern Territory, Australia; approximately lat. 24° 30.68′ S, long. 133° 15.75′ E. From Nicoll's Section 84/2004, sample 25A, 38 m above the base of the section (locality 5, J. M. Kennard, R. S. Nicoll & M. Owen, *Late Proterozoic and Early Palaeozoic depositional facies of the northern Amadeus Basin, central Australia, 12th International Sedimentological Congress, Canberra*, 83, fig. 29, 1986), Horn Valley Siltstone, middle Arenig, lower Ordovician.

Derivation of name: Latin, *latus*, broad; referring to the broad lobes in comparison with the type-species.

Figured specimens: Bureau of Mineral Resources, Canberra, Commonwealth Palaeontological Collection, nos. **CPC 29094** (holotype, LV: Pl. **17**, 94, fig. 1), **29095** (RV: Pl. **17**, 94, fig. 2), **29096** (car.: Pl. **17**, 94, fig. 3), **29097** (RV: Pl. **17**, 96, fig. 1), **29098** (RV: Pl. **17**, 96, fig. 2) and **29099** (car.: Pl. **17**, 96, fig. 3). All of the figured specimens are from the type locality.

Explanation of Plate 17, 94

Fig. 1, LV ext. lat. (holotype, **CPC 29094**, 0.88 mm long; fig. 2, RV ext. lat (**CPC 29095**, 0.88 mm long); fig. 3, car., ext. vent. (**CPC 29096**, 0.88 mm long).
Scale A (100 μm; ×90), figs. 1, 2; scale B (250 μm; ×60), fig. 3.

Diagnosis: Species of *Pilla* with two broad, elongate ('lobe-like') nodes, relatively close together; dorsally rounded. Posterior node more strongly developed, protruding above the straight hinge-line in lateral view. Lobe-like pseudovelum fused with nodes, gradually becomes confluent with domicilium posteroventrally of posterior node. Surface finely reticulate to granulose. Valve up 1.10 mm long.

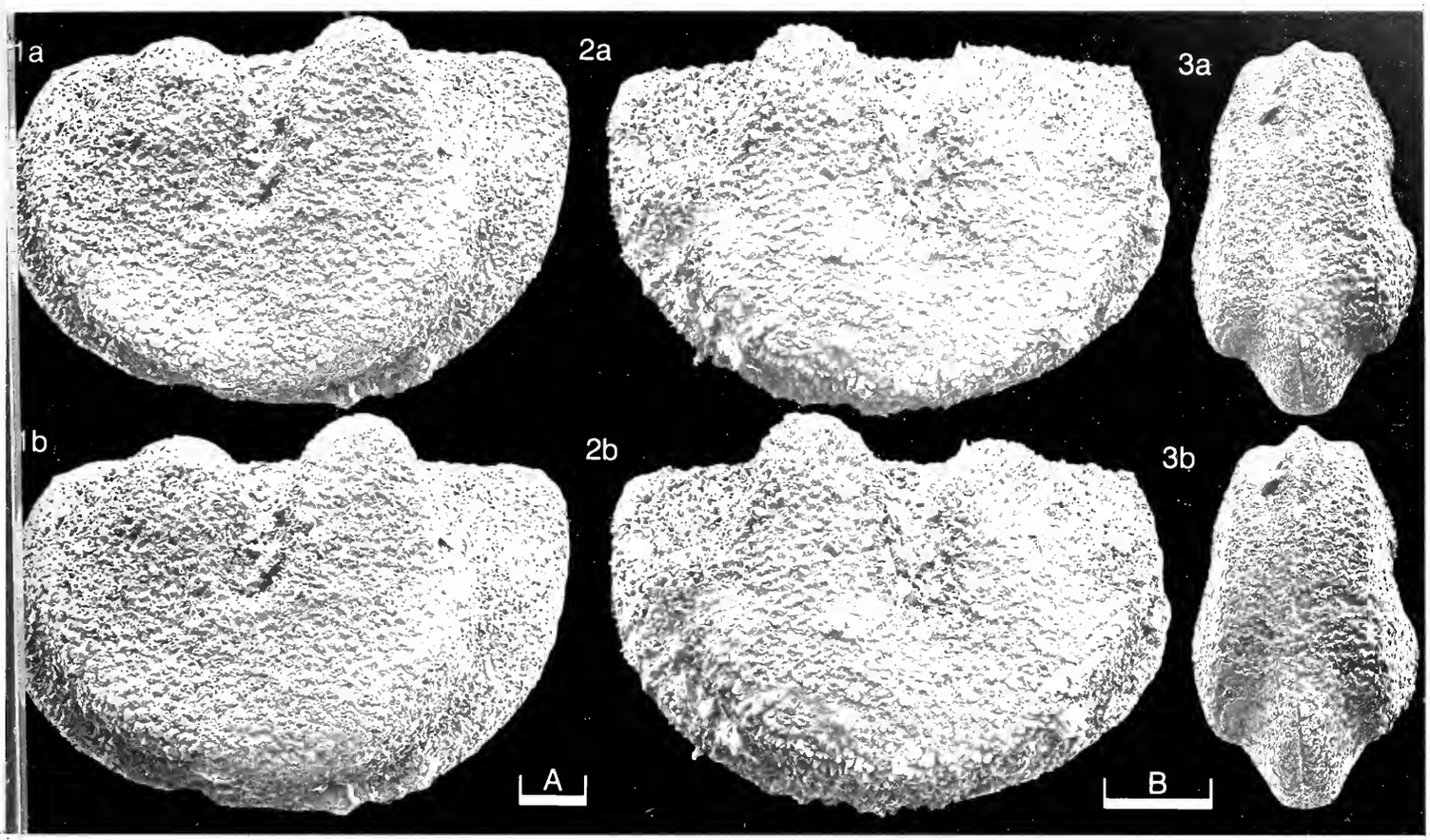
Remarks: This is the second known species of the genus. The type-species, *Pilla piformis* Schallreuter & Siveter, 1988 (*Stereo-Atlas Ostracod Shells* **15**, 25–28) from the upper Ordovician (upper Gisbornian or lower Eastonian) of New South Wales, is larger (1.71 mm long), and has smaller nodes which, moreover, are spaced further apart from each other and are equally well-developed above the hinge-line. Furthermore, in *P. piformis* the pseudovelum is distinctly separated from the nodes, and terminates posteriorly more or less abruptly.

In *P. latolobata*, the post-adductorial node (the dominant node) is in the N3 position, and the pre-adductorial node is in the N2 position (cf. diagnosis of *Pilla* of Schallreuter & Siveter, 1988). Some specimens have a finely reticulate surface; other, more corroded specimens, including those illustrated herein, are granulose. The size range (0.55 – 1.10 mm long) suggests that four instars are represented, but the largest may not be the adult stage.

Distribution: *Pilla latolobata* occurs in subsurface and other surface samples in the Arenig Series Horn Valley Siltstone of the Amadeus Basin, Australia. So far it is documented only from the type locality, where it is associated with conodonts, trilobites, chitinozoans, brachiopods, and nautiloids. Here, the ostracod assemblage consists of some 150 specimens, virtually all belonging to *P. latolobata*.

Explanation of Plate 17, 96

Fig. 1, RV ext. lat. (**CPC 29097**, 0.92 mm long); fig. 2, RV ext. lat. (**CPC 29098**, 1.10 mm long); fig. 3, car. with slightly skewed valves, ext. dors. (**CPC 29099**, 0.75 mm long).
Scale A (100 μm; ×90), fig. 1; scale B (250 μm; ×72), figs. 2, 3.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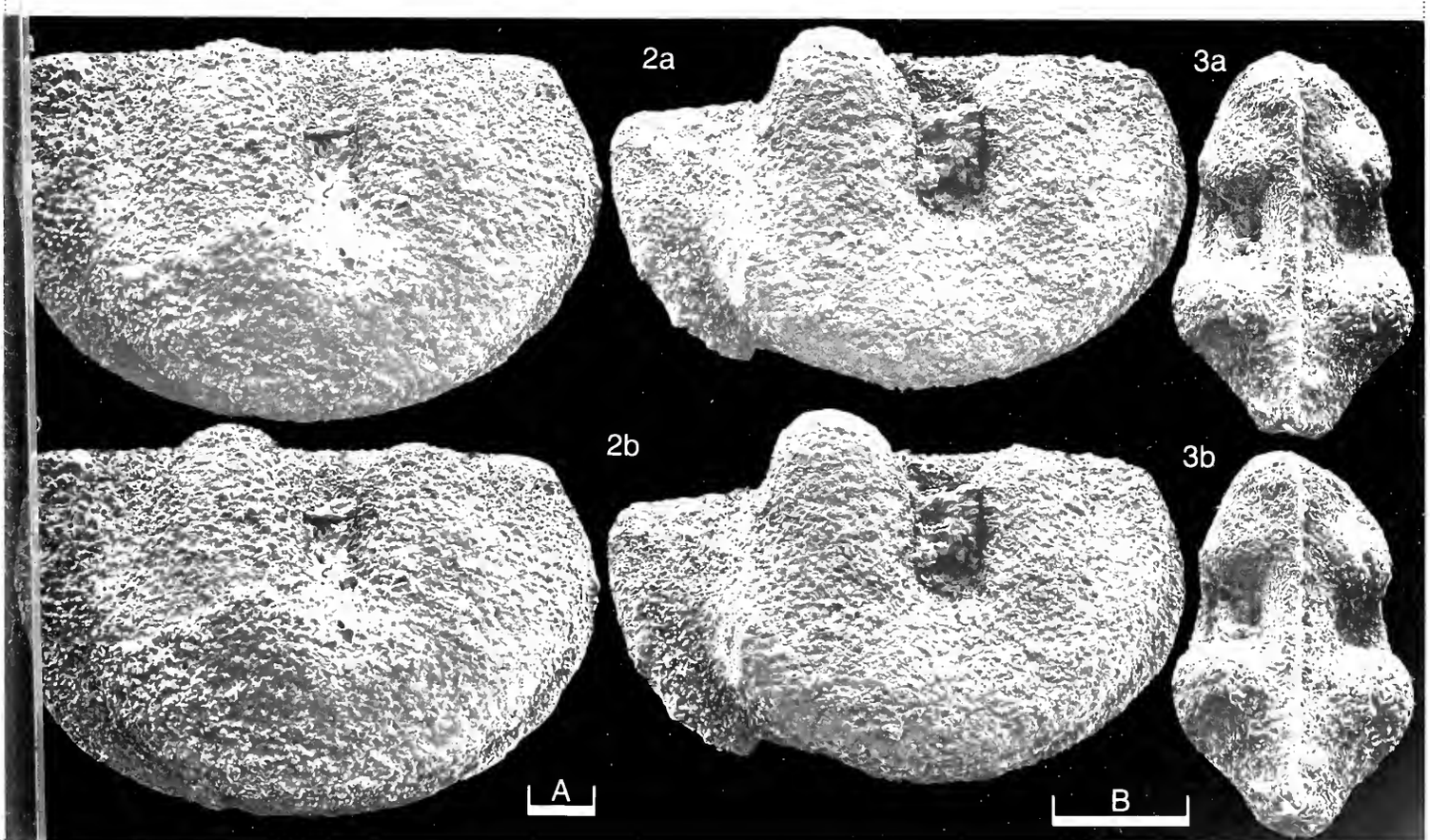
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595.337.22 (113.51) (761 : 162.088.34): 551.351+552.52

ON *NEOEUGLYPHELLA MANDELBAUMAE* DEWEY & PUCKETT gen. et sp. nov.

Christopher P. Dewey & T. Mark Puckett
(Mississippi State University & Alabama Geological Survey, U.S.A.

Genus *NEOEUGLYPHELLA* gen. nov.
Type-species : *Neoeuglyphella mandelbaumae* sp. nov.

Derivation of name: From the genus *Euglyphella* Warthin, 1934, plus the prefix *neo*, inferring new, young, or recent. Gender, feminine.

Diagnosis: Medium-sized, elongate carapace with left valve larger than right. Papillate ornament over lateral surface. Anterior and posterior marginal spines present. Hinge merodont. Adductor muscle scar consisting of about thirty individual spots in compact circular field.

Remarks: *Neoeuglyphella* possesses the characters of a typical ropolonellid (Quasillitacea) with respect to the nature of the hinge, the contact margin and the nature of the muscle scar. The (type-) species was first recognised in the Carboniferous Mississippian of Alabama by Emily Mandelbaum in her unpublished Master's Thesis (New York Univ., 143pp., 1970) as a new species questionably referrable to *Euglyphella*. Mandelbaum envisaged the species as being the culmination of a trend described by Peterson (*J. Paleont.*, **40**, 1–20, 1966) in which the loss of carinae in the middle Devonian *Euglyphella compressa* lineage, was associated with replacement by papillae. Our material from the Chesterian, Pride Mountain Formation in Alabama differs, however, from the original definition of the genus

Explanation of Plate 17, 98

Figs 1–3, adult car. (holotype, **3341–7a,** 1.075mm long): fig. 1, RV ext. lat.; fig. 2, dors.; fig. 3, LV ext. lat. Fig. 4, adult car. (paratype, **3341–7f,** 1.3mm long): LV ext. lat. Figs. 5,6, RV (paratype, **3341–7e,** 0.95mm long): fig. 5, adductor muscle field; fig. 6, RV int. lat. Scale A (100 μm; ×48), figs. 1–4; scale B (50 μm; ×260), fig. 5; scale C (100 μm ×48), fig. 6.

Euglyphella Warthin, 1934 (*Contr. Mus. Paleont. Univ. Mich.*, **4**, 205–226) by the complete lack of lateral carinae and the occurrence of an irregular papillate ornament.

Neoeuglyphella mandelbaumae sp. nov.

Holotype: Dunn–Seiler Museum of Geology, Mississippi State University. no. **3341–7a**; adult carapace. [Paratypes nos. **3341–7b–7f**; two adult carapaces and three valves].

Type locality: Section at Williams Spring, SW of Barton, Alabama, U.S.A. Sec. 34 T4S R14W; lat. 34°39′54″N, long. 87°59′25″W. Upper Pride Mountain Formation, Chesterian, Mississippian, Carboniferous; 4.29m above the base of the section in grey fossiliferous shale; marine.

Derivation of name: After Emily Mandelbaum, who first recognised the species in Alabama.

Figured specimens: Dunn–Seiler Museum of Geology, Mississippi State University, nos. **3341–7a** (holotype, adult car.: Pl. **17,** 98, figs. 1–3), **3341–7b** (paratype, adult car.: Pl. **17,** 100, figs. 1–3), **3341–7c** (paratype, LV: Pl. **17** 100, fig. 4), **3341–7d** (paratype, RV: Pl. **17,** 100, figs 5, 6), **3341–7e** (paratype RV: Pl. **17**, 98, figs. 5, 6), **3341–7f** (paratype, adult car.: Pl. **17,** 98, fig. 4). All from the type locality; grey shale with abundant crinoid and fenestrate bryozoan debris and brachiopods.

Diagnosis: Elongate carapace with left valve strongly overlapping right. Fusiform in dorsal outline with pinched ends. Cardinal angles obtuse, rounded. Hinge straight, merodont, with crenulate terminal elements, inclined posteriorly from point of maximum height at anterior cardinal angle. Irregular papillae over lateral surface and tiny spines at dorsal and anterior margins on both valves. Adductor muscle scar consists of about thirty spots in compact circular field. Dimorphism not recognised.

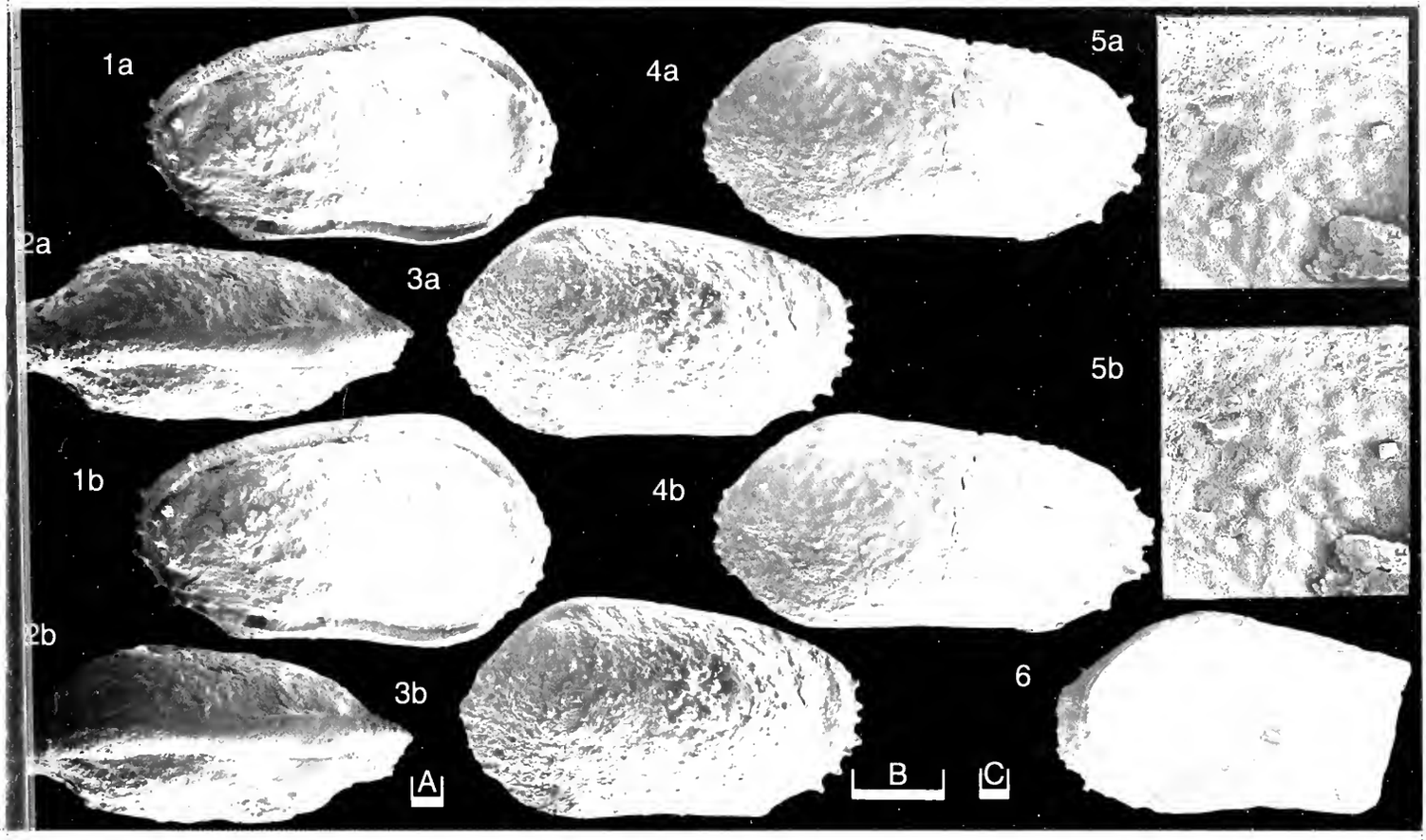
Remarks: *Neoeuglyphella* is only known from a single species, although it is possible that *Euglyphella abdita* Peterson, op. cit., 1966 should be assigned to this genus.

Distribution: Pride Mountain Formation, Chesterian, Mississippian of the Black Warrior Basin, Alabama, U.S.A.

Acknowledgement: We acknowledge the financial support given by the Donors of the Petroleum Research Fund administered by the American Chemical Society; the Mississippi Mineral Resources Institute and Mississippi State University.

Explanation of Plate 17, 100

Figs. 1–3, adult car. (paratype, **3341–7b,** 1.22mm long): fig. 1, dors.; fig. 2, RV ext. lat.; fig. 3, LV ext. lat. Fig. 4, LV int. lat. (paratype, **3341–7c,** 1.25mm long). Figs 5,6, RV (paratype, **3341–7d,** 1.125mm long): fig. 5, RV int. lat.; fig. 6, adductor muscle field. Scale A (100 μm; ×48), figs. 1–4; scale B (100 μm; ×48), fig. 5; scale C (50 μm; ×260), fig. 6.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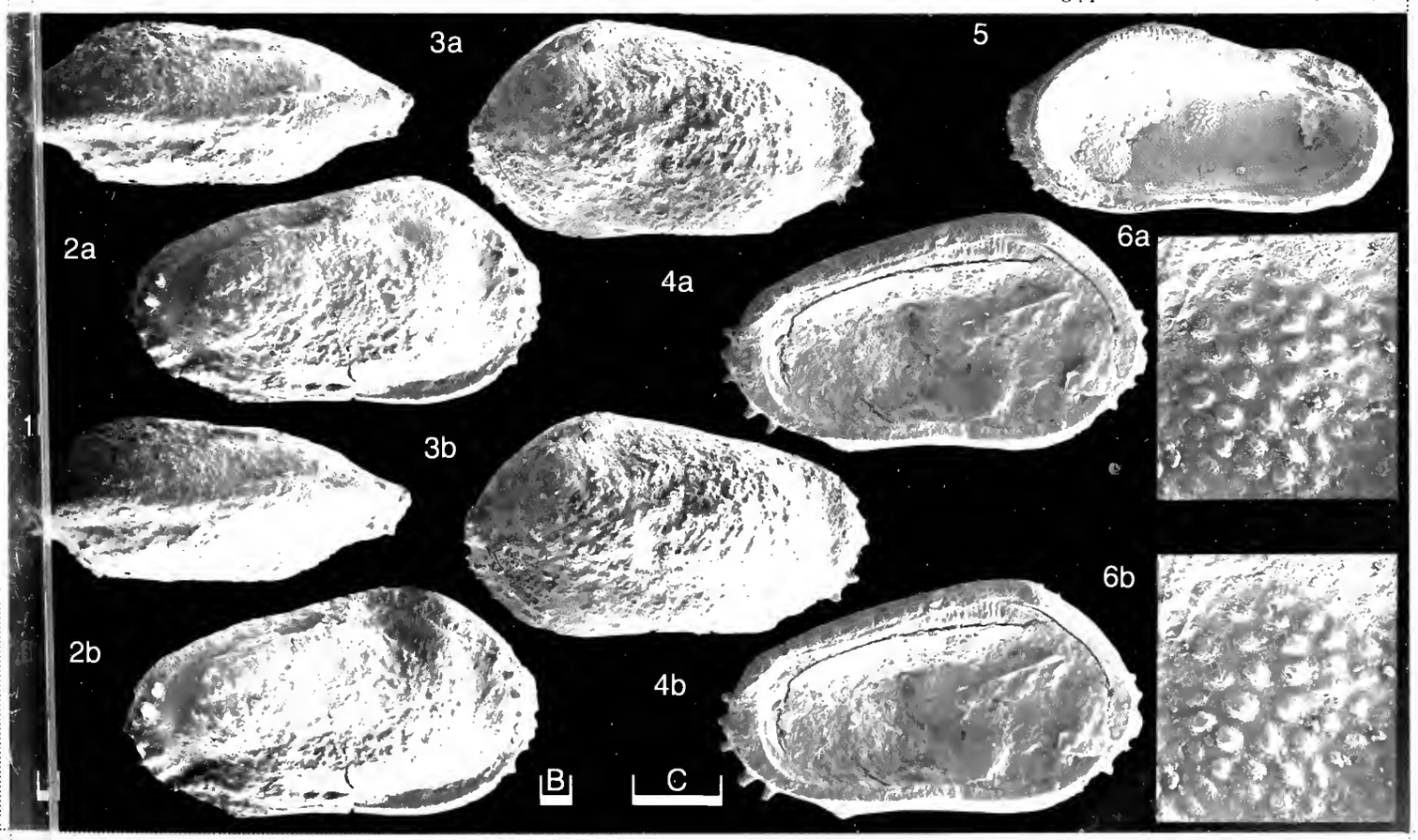
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595.337.12 (116.31) (81 : 164.039.13+164.037.11+163.013.03) : 551.312

ON *SEBASTIANITES FIDUS* KROMMELBEIN

by John W. Neale & Su Deying
University of Hull, England & Institute of Geology,
Chinese Academy of Geological Sciences, Beijing, China

Genus *SEBASTIANITES* Krommelbein, 1962

Type-species (original designation) : *Cypridea (Sebastianites) fida* Krommelbein, 1962

1962 *Cypridea (Sebastianites)* subgen. nov. K. Krommelbein, *Senckenberg.leth.*, **43,** 460.

Diagnosis: Shell large, without rostrum. Valves with median sulcus and characteristic swellings. Ornamentation mostly of abundant pore pits on swollen areas, leaving the sulcus smooth.

Remarks: Forms with a rostrum are excluded from this taxon. Krommelbein's subgenus is here removed from *Cypridea* and given full generic rank.

Sebastianites fidus Krommelbein, 1962

1962 *Cypridea (Sebastianites) fida* sp. nov. K. Krommelbein, *Senckenberg. leth.*, **43,** 460, pl. 57, fig. 31.

Holotype: Senckenberg Museum, Frankfurt-am-Main, no. **SMF Xe 4203**; carapace.

Type locality: Borehole SOst–1–Ba, 810–870m depth, Reconcavo Basin, eastern Bahia State, Brazil (between lat. 11 and 13°S and long. 37 and 39°W); Sebastiao Beds, highest Neocomian (immediately pre–Aptian).

Explanation of Plate 17, 102

Figs. 1,2, car. (holotype, **SMF Xe 4203,** 1150 µm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors; fig. 3, car., ext.lt.lat. (paratype **SMF Xe 4204,** 1100 µm long).

Scale A (200 µm; × 55), figs. 1–3.

Figured specimens: Senckenberg Museum nos. **SMF Xe 4203** (holotype, car.: Pl. **17,** 102, figs. 1, 2), **SMF Xe 4204** (paratype, car.: Pl. **17,** 102, fig. 3). University of Kiel, Germany, nos. **4** (car.: Pl. **17,** 104, figs 1, 2), **2** (LV: Pl. **17,** 104, figs 3, 4).
SMF Xe 4203 and **Kiel 2,** from type locality and horizon; **SMF Xe 4204** and **Kiel 4,** from same borehole, but at a depth of 540–570m.

Diagnosis: Dorsal margin almost straight to slightly concave with relatively high set posterior cardinal angle. Sulcus branching into three ventrally, between swellings.

Remarks: Krommelbein (*op. cit.*, 1962) originally assigned 5 species to *Sebastianites;* of these, only 2 (*fidus* and *devexus)* are accepted here. Of the remainder, albeit questionably referred to the taxon by Krommelbein, all have rostra and belong elsewhere. Of 3 more species from Brazil tentatively placed here by Krommelbein & Weber, 1971 (*Beih. geol. Jb.*, **115,** 24 *et seq.*), *Cypridea (Sebastianites?) matinversa,* with its well developed rostrum, does not belong here; the other two may.

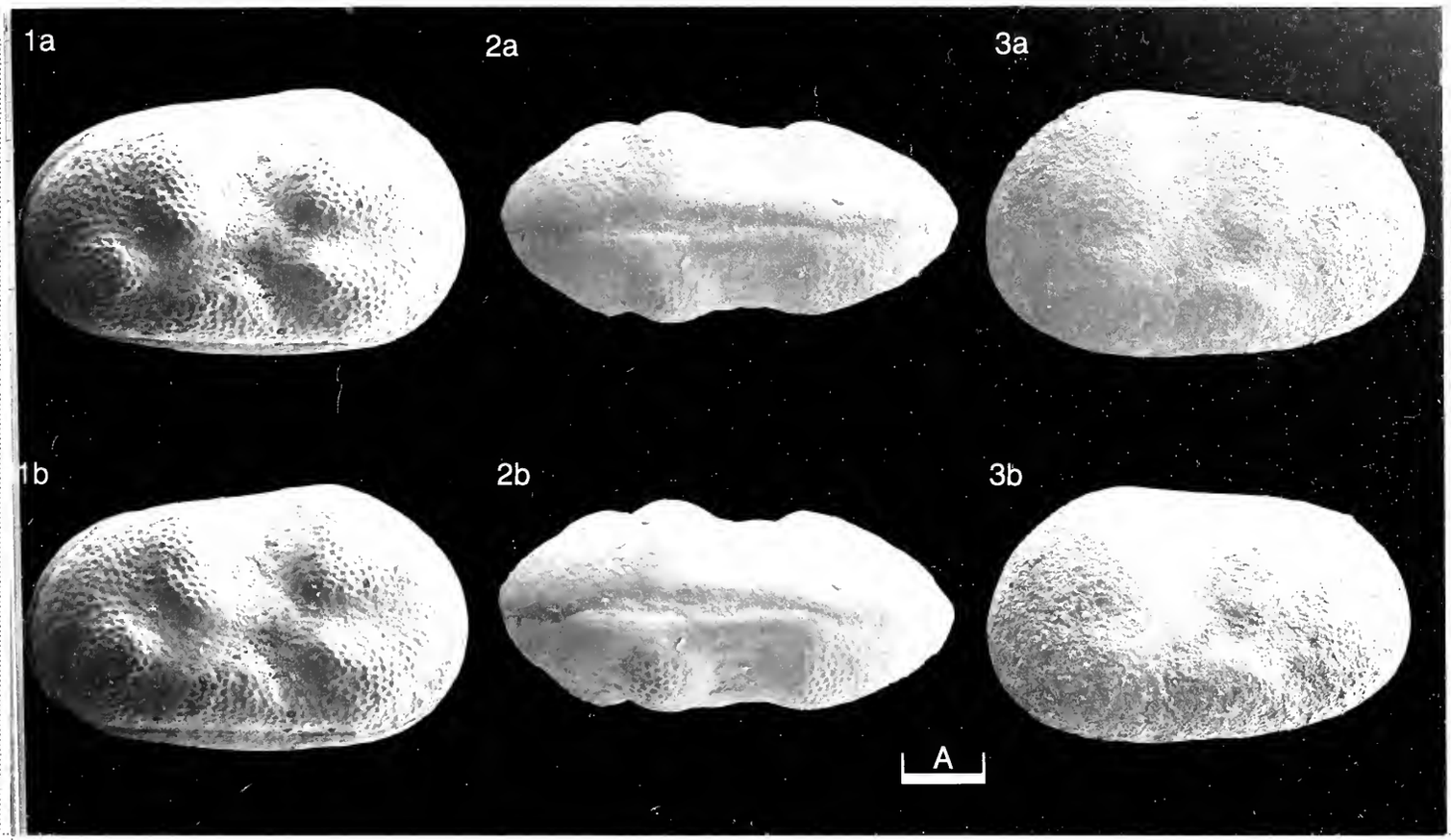
Distribution: Sebastiao Beds, Reconcavo Basin (herein), Barra de Itiuba Formation, Sergipe-Algoas Basin (Schaller, 1969, *Boll. Tech. Petrobas,* **12,** 21), Campos Basin (Moura, 1988, *Proc. 9th Int. Symp. Ostr.*, Shizuoka, 1210), all from Brazil; Gabon and the Congo (de Klasz & Micholet, 1970, *Proc. 4th Coll. Afr. Micropal.*, Abidjan, 123), West Africa. All records appear to be of a similar age to the type locality (latest Neocomian).

Acknowledgements: Dr H. Malz for photographs of the type material and Dr N. Mostafawi for the loan of Krommelbein's material from the University of Kiel; also the W.C. Wong Foundation for providing a Royal Society Fellowship which enabled Dr Su to study at Hull.

Explanation of Plate 17, 104

Figs. 1,2, car. (**Kiel 4,** 1190 µm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors.; figs 3,4, LV (**Kiel 2,** 1260 µm long): fig. 3, ext. dors.; fig. 4 int. lat.

Scale A (200 µm; × 53), figs. 1–4.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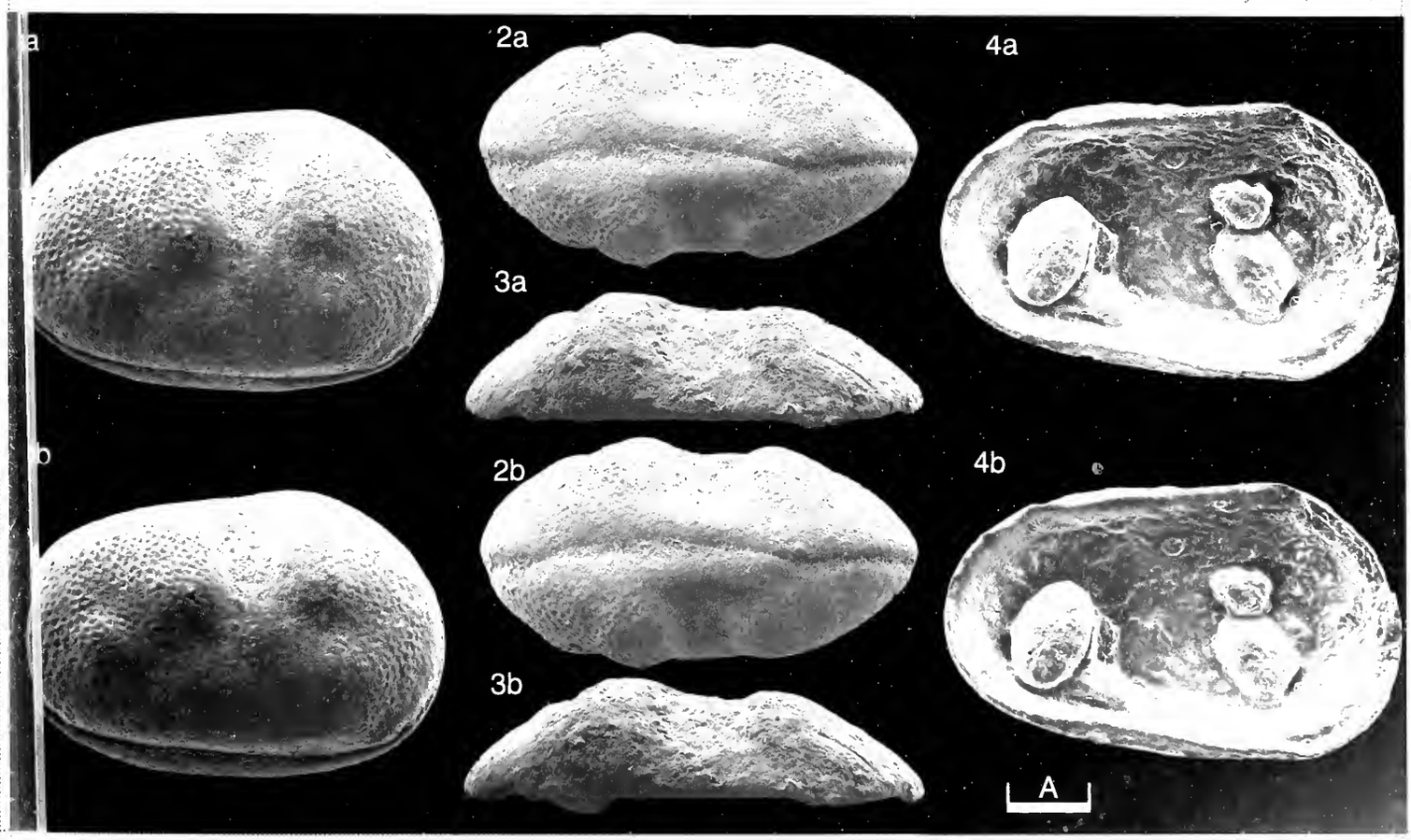
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Stereo-Atlas of Ostracod Shells 17 (22) 105–112 **(1990)**
595.337.12 (116.312/313) (510 : 161.124.43) : 551.312

ON *STRUMOSIA INANDITA* (SU)

by Su Deying & John W. Neale
(Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China & University of Hull, England)

Genus *STRUMOSIA* Su & Li, 1989
Type-species (original designation) : *Ilyocyprimorpha inandita* Su, 1959
1989 *Strumosia* gen. nov. Su Deying & Li Yougui, In *The Palaeontology and Stratigraphy of the Jurassic and Cretaceous in Eastern China*, Geological Publishing House, Beijing, 138.

Diagnosis: Carapace large, subrectangular, with ornament of pustules, tubercles or spines; valves relatively thin. Left valve larger than right valve, overlapping latter along free margin, particularly ventrally. Hinge adont. Inner lamella fairly narrow with small anterior and posterior vestibula; marginal zone narrow with straight, simple and short marginal pore canals. Muscle scar pattern of 6 central adductors, of which 4 form an anterior arc, the uppermost one being the largest; behind this arc is an elliptical/reniform scar with another, small contiguous oval scar posterior to it. Two mandibular scars, a frontal scar and several dorsal scars are also present.

Explanation of Plate 17, 106

Fig. 1, LV, int.lat. (**CAGSB 10.21,** 1250 µm long); fig. 2, car., ext.rt.lat. (holotype, **CAGSB 192,** 1300 µm long); fig. 3, RV, int.lat. (**CAGSB 10.19,** 1300 µm long).
Scale A (200 µm; × 50), figs. 1–3.

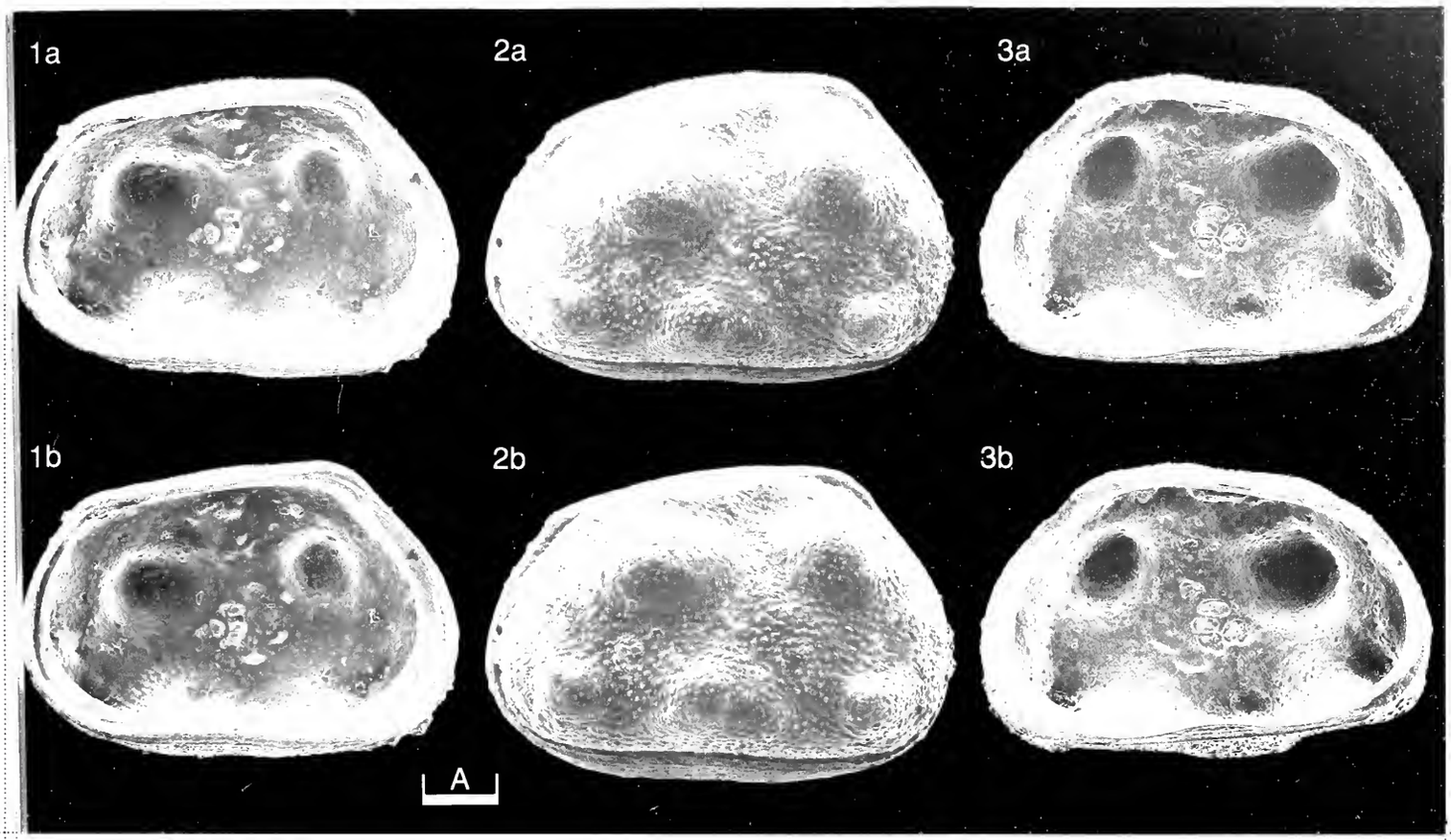
Remarks: The genus *Strumosia*, from the M. Cretaceous of the Songliao Basin, differs from *Ilyocyprimorpha* (Mandelstam in L.I. Galeeva, 1955, *Cretaceous ostracods of the Mongolian People's Republic*, Gostoptekhizdat, Moscow, 47), to which its type species was first assigned, in having a thinner shell, in having the *left* valve larger than the right, and in lacking the wide dorsal sulcus. *Strumosia* tends to be more tuberculate, has a pustulose/spinose surface and the inner lamella and zone of pore canals are narrower than in *Ilyocyprimorpha*. *Strumosia* is somewhat similar to the Brazilian genus *Sebastianites* Krommelbein, 1962 (see J.W. Neale & Su Deying, *Stereo-Atlas of Ostracod Shells*, **17**, 101-104, 1990), particularly in the pattern of tuberculation. It differs, however, in its more quadrangular/trapezoidal shell, whereas in both species definitely assigned to *Sebastianites* by the original author (*S. fidus* and *S. devexus*), both ends are symmetrically rounded. In *Strumosia* the left valve overreaches the right valve dorsally, a feature not present in *Sebastianites*, the ornamentation is pustulose rather than reticulate and is also present over the sulcus/depression; the tuberculation is also much more accentuated.

Strumosia inandita (Su, 1959)

1959 *Ilyocyprimorpha inandita* sp. nov. Su Deying, *in* M.A. Netchaeva, Liu Zhongyun, Su Deying, Sou Zhixi, Tian Guizhen & Tsao Lianbi, *Lower Cretaceous Ostracoda from the Songliao Basin*, Beijing, 34, pl. 13, figs. 1–9.
1974 *Ilyocyprimorpha inandita* Su; Hao Yichun, Su Deying, Li Yougui, Ruan Peihua & Yang Fengtian, *Cretaceous-Tertiary Ostracoda from the Songliao Basin*, Beijing 49, pl. 17, figs. 4a-e.
1986 *Ilyocyprimorpha inandita* Su; Hou Youtang & Zhao Yuhong, *Acta Micropaleont. sin.*,**3**, 227, pl. 5, figs. 7, 8.
1989 *Strunosia inandita* (Su); Su Deying & Li Yougi, in *The Palaeontology and Stratigraphy of the Jurassic and Cretaceous in Eastern China*, Beijing, 138, pl. 35, figs. 1–9.

Explanation of Plate 17, 108

Fig. 1, LV, ext.dors. (**CAGSB 10.17,** 1350 µm long); fig. 2, RV, ext.dors. (**CAGSB 10.18,** 1360 µm long); fig. 3, juv.car., ext.vent. (**CAGSB 10.22,** 975 µm long); fig. 4, car., ext.dors. (holotype, **CAGSB 192,** 1300 µm long).
Scale A (200 µm; × 50), figs. 1–4.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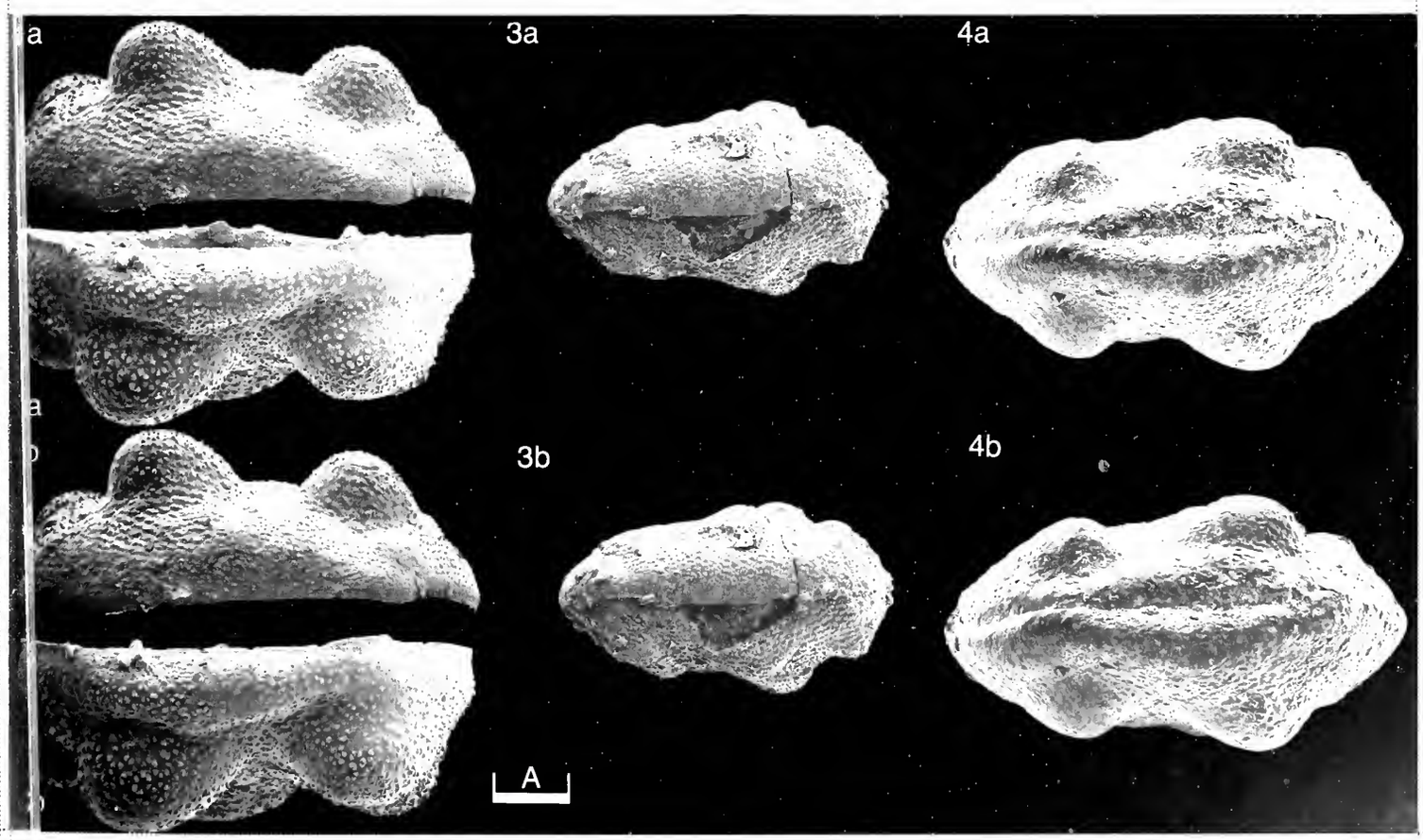
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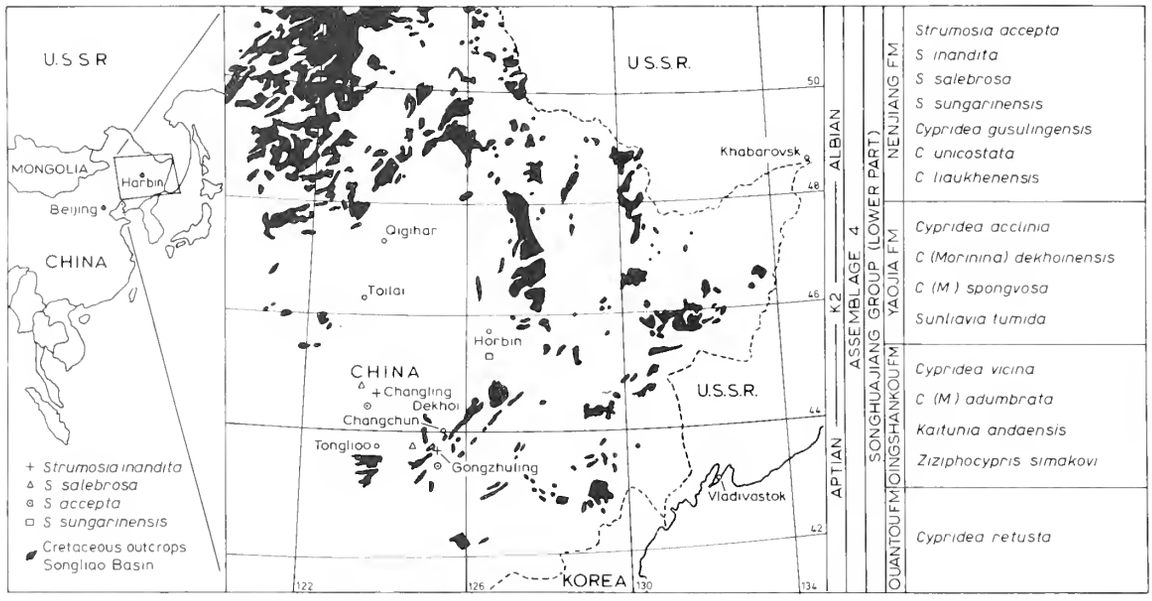


Text Fig. 1 Map and stratigraphic section showing, respectively, the type locality and horizon of *Strumosia inandita* and other species of *Strumosia*.

Explanation of Plate 17, 110

Fig. 1, RV, ext.lat. **(CAGSB 10.18,** 1360 μm long); fig. 2, juv.RV, ext.lat. **(CAGSB 10.22,** 975 μm long); fig. 3, LV, ext.lat. **(CAGSB 10.17,** 1350 μm long).
Scale A (200 μm; ×50), figs. 1–3.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing **(CAGSB)** no. **192;** carapace.

Type locality: Nenjiang Formation, Gongzhuling (Huaide)(lat. 43°30′N, long. 124°48′E), Jilin Province, Songliao Basin, China (see Text-fig. 1); Middle Cretaceous.

Derivation of name: A reference to the prominent nodes on the surface of the carapace.

Figured specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing **(CAGSB)** nos. **192** (holotype, car.: Pl. **17,** 106, fig. 2; Pl. **17,** 108, fig. 4), **10.17** (LV: Pl. **17,** 108, fig. 1; Pl. **17.** 110, fig. 3), **10.18** (RV: Pl. **17,** 108, fig. 2; Pl. **17,** 110, fig. 1) **10.19** (RV: Pl. **17,** 106, fig. 3; Pl. **17.** 112, fig. 1) **10.21** (LV: Pl. **17,** 106, fig. 1; Pl. **17**, 112, fig. 3) **10.22** (juv. RV: Pl. **17,** 108, fig. 3; Pl. **17,** 110, fig. 2), **10.23** (juv. LV: Pl. **17,** 112, fig. 2). All from the type locality and horizon.

Diagnosis: A species of *Strumosia* with five well developed tubercles and overall pustulose ornamentation.

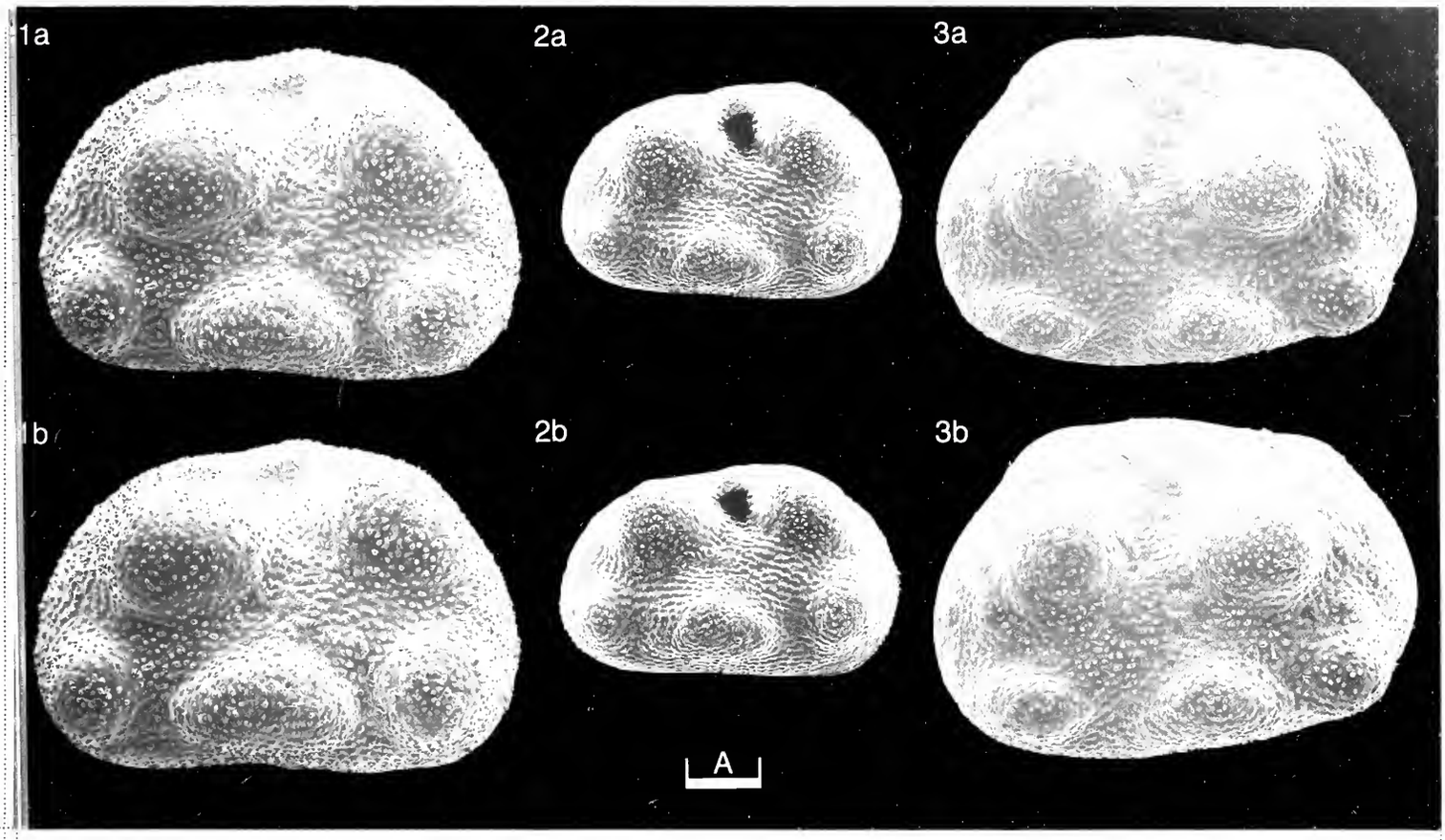
Remarks: Included in *Strumosia* are the species *S. accepta* (Liu, 1959), *S. sungariensis* (Ten, 1959) and *S. salebrosa* (Su, 1959) (all *in* M.A. Netchaeva *et al., op.cit.).* These differ from the type species mainly in the number and disposition of the tubercles.

Distribution: Nenjiang Formation, lower part of Songhuajiang Group (Aptian/Albian), at Gongzhuling (Huaide) and Changling, Jilin Province; Songliao Basin; non-marine. See Text-fig. 1 for localities and faunal associations.

Acknowledgements: We wish to express our gratitude to the K.C. Wong Foundation for providing a Royal Society Fellowship which enabled Dr Su to study in Hull.

Explanation of Plate 17, 112

Fig. 1, RV, int.musc.sc. **(CAGSB 10.19)**; fig. 2, juv. LV, ext.lat. **(CAGSB 10.23,** 780 μm long); fig. 3, LV, int.musc.sc. **(CAGSB 10.21).**
Scale A (100 μm; ×110), figs. 1,3); scale B (200 μm; ×50), fig. 2.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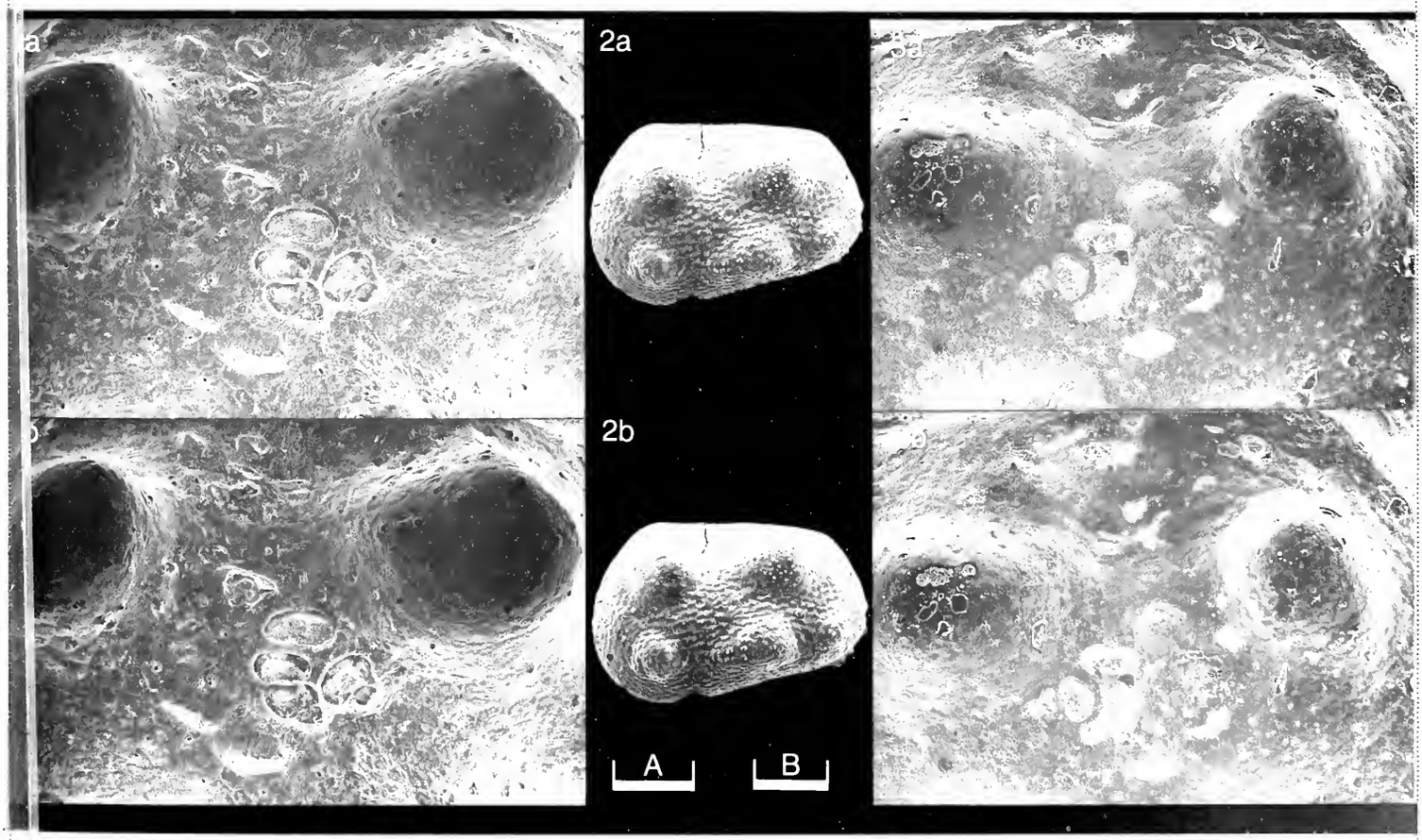
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595.336.14 (113.45) (430 : 161.007.50) : 551.351+552.54

ON *REFRATHELLA STRUVEI* BECKER

by Gerhard Becker
(University of Frankfurt, Germany)

Genus *REFRATHELLA* Becker, 1967
Type-species (by original designation) : *Refrathella struvei* Becker, 1967.

Diagnosis: Kirkbyellid with distinct, comparatively large ventral lobe, surrounded with crests (cristal loop). Distinct adventral rim; sometimes additional cristae laterally and dorsally developed. Lateral carapace surface, including ventral lobe, reticulate.

Distribution: W. and Central Europe; lower Devonian (Upper Emsian) to upper Devonian (Frasnian).

Refrathella struvei Becker, 1967.

1967 *Refrathella struvei* sp. nov. G. Becker, *Senckenberg. leth.*, **48,** 516–518, text–figs. 1, 2, pl. 1, figs. 1–8.
1985 *Refrathella struvei* Becker; M. Coen, *Mém Inst. géol. Univ. Louvain,* **32,** tabs. 2, 3, pl. 32, figs. 13, 14.

Holotype: Forschungs–Institut Senckenberg, Frankfurt am Main, Germany, no. **SMF Xe 4987;** an adult LV.

Type locality: Outlet for water, SW end of submerged quarry "Steinbreche Refrath", about 1 km SW of Refrath village, SW of Bergisch-Gladbach, Bergisches Land, Rheinisches Schiefergebirge, Germany; lat. 50°59′N, long. 07°09′E. Coral limestones with yellowish marls; Refrath Formation, Frasnian (do I), upper Devonian.

Explanation of Plate 17, 114

Fig. 1, adult LV, ext. lat. (holotype, **SMF Xe 4987,** 670 µm long); fig. 2, adult RV, ext. lat. (paratype, **SMF Xe 4989,** 620 µm long).
Scale (200 µm; ×133), figs. 1, 2.

Figured specimens: Forschungs–Institut Senckenberg (SMF), Frankfurt-am-Main, Germany, nos. **SMF Xe 4987** (adult LV, holotype: Pl. **17,** 114, fig. 1; Pl. **17,** 116, figs. 1–3), **SMF Xe 4989** (adult RV, paratype: Pl. **17,** 114, fig. 2; Pl. **17,** 116, figs. 4, 5).

All of the figured specimens are topotypic material.

Diagnosis: Thick-shelled, finely reticulate *Refrathella* species with angular ventral lobe and distinct adventral structure; cristal loop on ventral lobe anteriorly extended; dorsal plica developed.

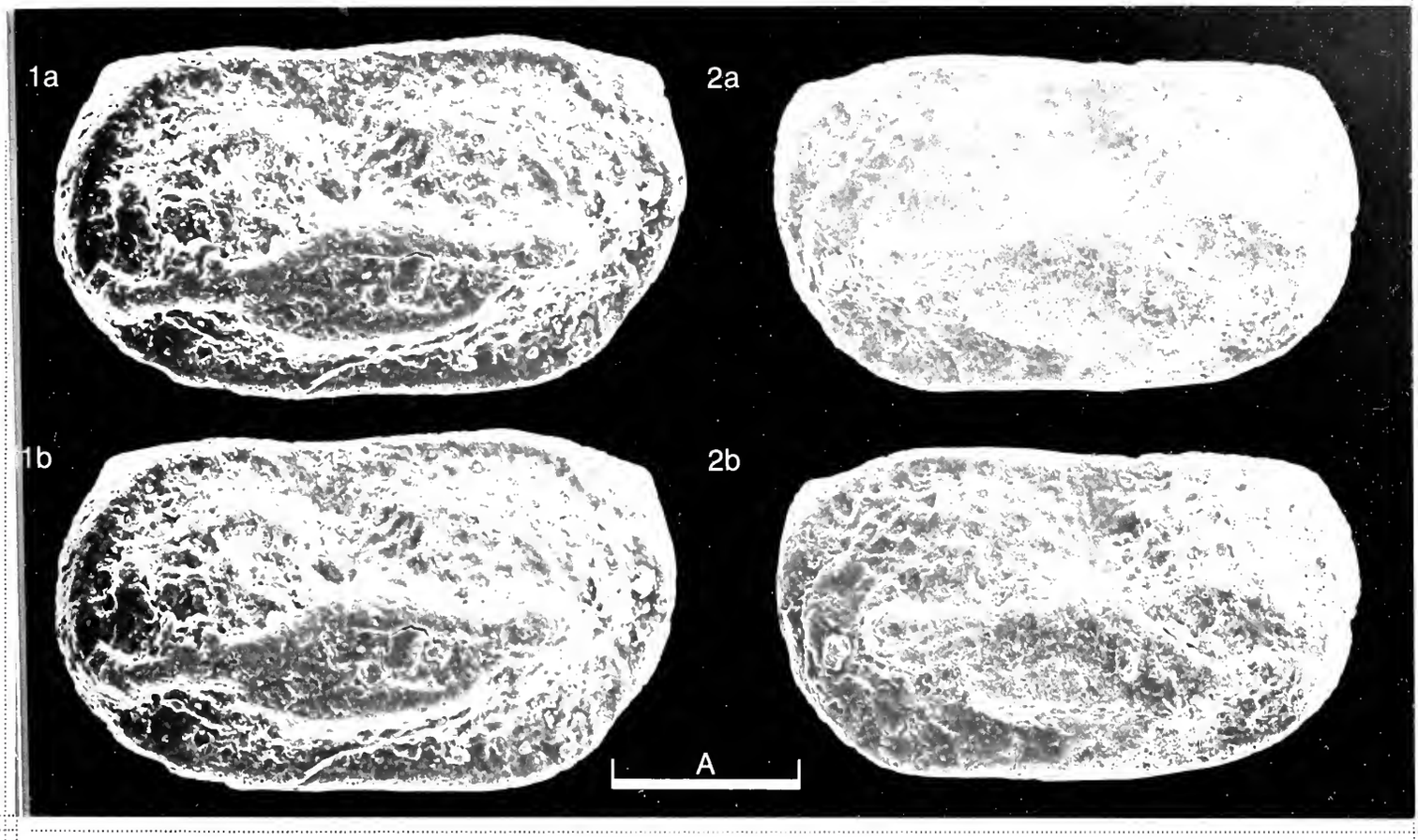
Remarks: *Refrathella struvei* Becker, 1967 belongs to the family Kirkbyellidae Sohn, 1961 (incertae superfamily). It is distinguished from other species of the genus (and from the other Kirkbyellidae) by its comparatively strongly developed ornamentation. Groos *(Göttinger Arb. Geol. Palaeont.,* **1,** 32, 1969) treats *Refrathella* Becker, 1967 as a subgenus of *Kirkbyella* Coryell & Booth, 1933; she treats *Berdanella* Sohn, 1961 in similar fashion.

The Kirkbyellidae Sohn, 1961 do not belong to the Kirkbyacea Ulrich & Bassler, 1906, as was already pointed out by Sohn *(Treatise Invertebrate Paleontology,* Part Q, **3,** Q131, 1961). Most probably, they show relations to forms described by Schallreuter *(Wiss. Z. Ernst Moritz Arndt-Univ. Greifswald,* **17,** 144, 1968; **21,** 207, 1972) and Gramm *(Paleont. Zh.* **21,** 95, 1988) from Ordovician and Lower Carboniferous beds respectively from Northern Europe. *R. struvei* is considered to be a benthic species.

Distribution: Ardenno-Rhenish Massif; middle Devonian (Fromelennian) to upper Devonian (Refrath Formation, Frasnian).

Explanation of Plate 17, 116

Figs. 1–3, adult LV, (holotype, **SMF Xe 4987,** 670 µm long); fig. 1, ext. dors.; fig. 2, vent.; fig. 3, ext. post. Figs 4, 5, adult RV (paratype, **SMF Xe 4989,** 620 µm long): fig. 4, ext. dors.; fig. 5, ext.ant.
Scale (200 µm; ×133), figs. 1–5.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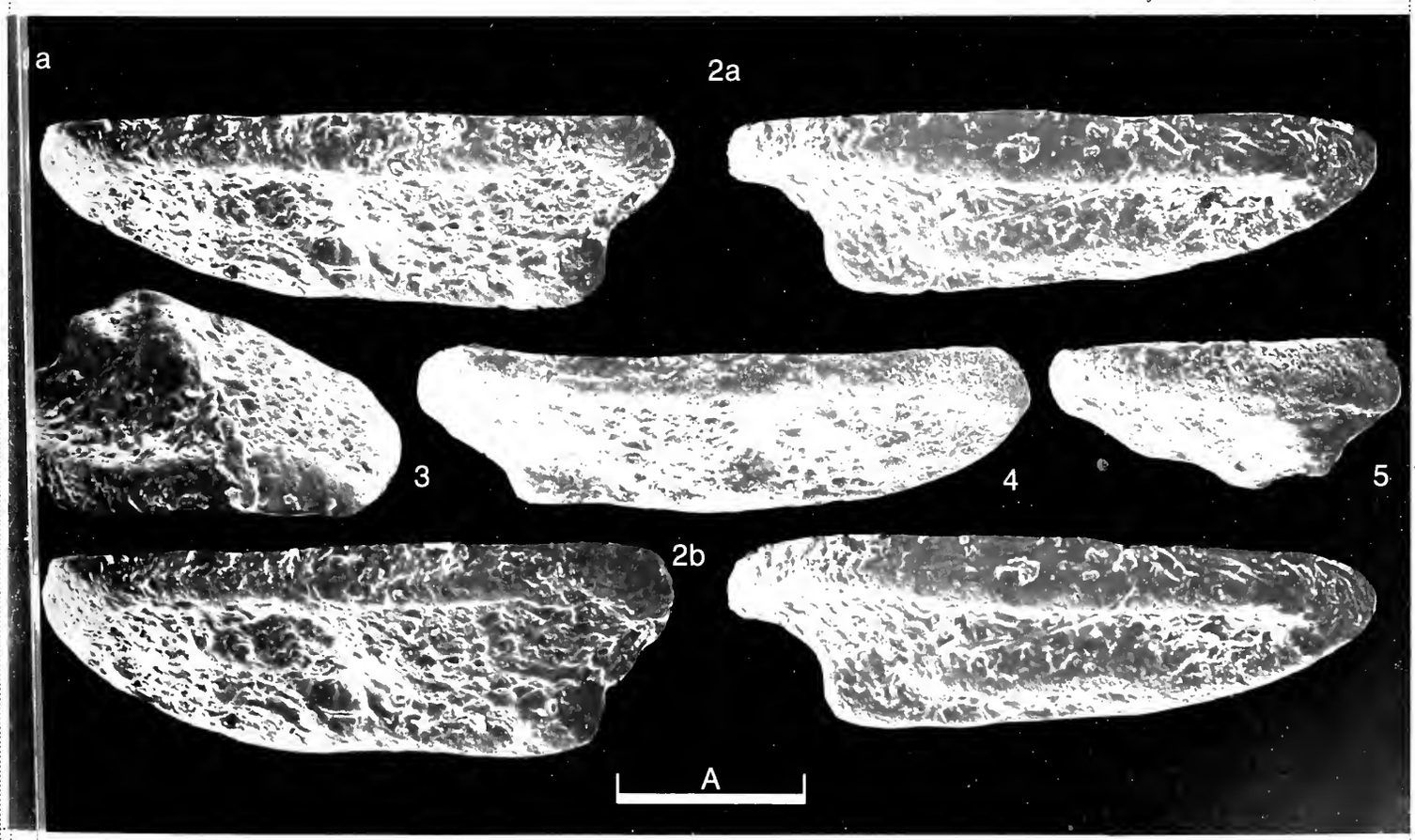
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ON *BAIRDIA CURTA* M'COY

by Gerhard Becker, Michel Coen & Thomas Jellinek
(University of Frankfurt, Germany
& University of Louvain-la-Neuve, Belgium)

Genus *BAIRDIA* M'Coy, 1844

Type-species (subsequent designation by Ulrich & Bassler, 1923): *Bairdia curtus* M'Coy, 1844.

Diagnosis: Bairdiid with convex to straight dorsal margin and more or less pronounced dorso-anterior and dorso-posterior margins; posterior extremity of the carapace distinctly pointed ("bairdiid" outline). Left valve overreaches and overlaps the right valve. Distinct calcified inner lamella with vestibula. Adductor muscle scar bairdiid. Surface smooth or with weak ornamentations.

Remarks: According to Becker *(Senckenberg. leth.*, **46,** 414-415, 1965), three *Bairdia* subgenera are distinguishable: *B. (Bairdia)* M'Coy, 1844 (type-species *B. curta* M'Coy, 1844; dorsal margin convex, dorso-anterior and dorso-posterior margins concave); *B. (Rectobairdia)* Sohn, 1960 (type-species *B. distressa* Sohn, 1940; dorsal margin straight, dorso-anterior and dorso-posterior margins concave); and *B. (Cryptobairdia)* Sohn, 1960 (type-species *B. ventricosa* Roth & Skinner, 1930; dorsal margin, dorso-anterior and dorso-posterior margins gently convex rounded). *Orthobairdia* Sohn, 1960 (type-species *B. cestriensis* Ulrich, 1891) is considered to be a synonym of *B. (Rectobairdia)* Sohn, 1960.

Distribution: Worldwide; Silurian to Recent.

Bairdia curta M'Coy, 1844.

1844 *Bairdia curtus* sp. nov. F. M'Coy, *Synopsis of characters of the Carboniferous Limestone fossils of Ireland,* 1st. ed., Dublin University Press, 164, pl. 23, fig. 6.

Explanation of Plate 17, 118

Figs. 1, 2: adult LV, (**SMF Xe 14870,** 2880 µm long); fig. 1, ext. lat.; fig. 2, ext. dors. obl. Scale A (1000 µm; ×33), figs. 1, 2.

1879 *Bairdia curta* M'Coy; T.R. Jones & J.W. Kirkby, *Q. Jl geol. Soc. Lond.*, **35** (44), 567-568, 580, pl. 28, figs. 1, 2.
1923 *Bairdia curta* M'Coy; E.O. Ulrich & R.S. Bassler, *Maryland geol. Surv.*, Baltimore, *Silurian Volume*, 320.
1989 *Bairdia (Bairdia) curta* M'Coy; G. Becker, A.R. Lord & H. Malz, *Cour. ForschInst. Senckenberg*, **113,** 32 (*q.v.* for full synonymy).
1990 *Bairdia (Bairdia) curta* M'Coy; G. Becker, M. Coen, A.R. Lord & H. Malz, *Cour. ForschInst. Senckenberg*, **123,** 277, pl. 4, fig. 33 a-d.

Type specimens: M'Coy's original material is lost (see under "Remarks").

Type locality: Quarry about 0.5km N of Granard, Townland of Granard, Co. Longford, Ireland; lat. 53°46′N, long. 07°30′W. Dark grey limestones, upper Courceyan (upper Tournaisian), lower Carboniferous.

Figured specimen: Forschungs-Institut Senckenberg, Frankfurt-am-Main (SMF), Germany, no. **SMF Xe 14870** (adult LV: Pl. **17,** 118, figs. 1, 2; Pl. **17**, 120, figs. 1-4). Topotype specimen.

Diagnosis: Carapace in lateral view elongate. Dorsal margin moderately high with greatest height about mid-length. Anterodorsal extremity somewhat angular; posterior extremity situated below mid-height. Surface smooth. Species is comparatively large.

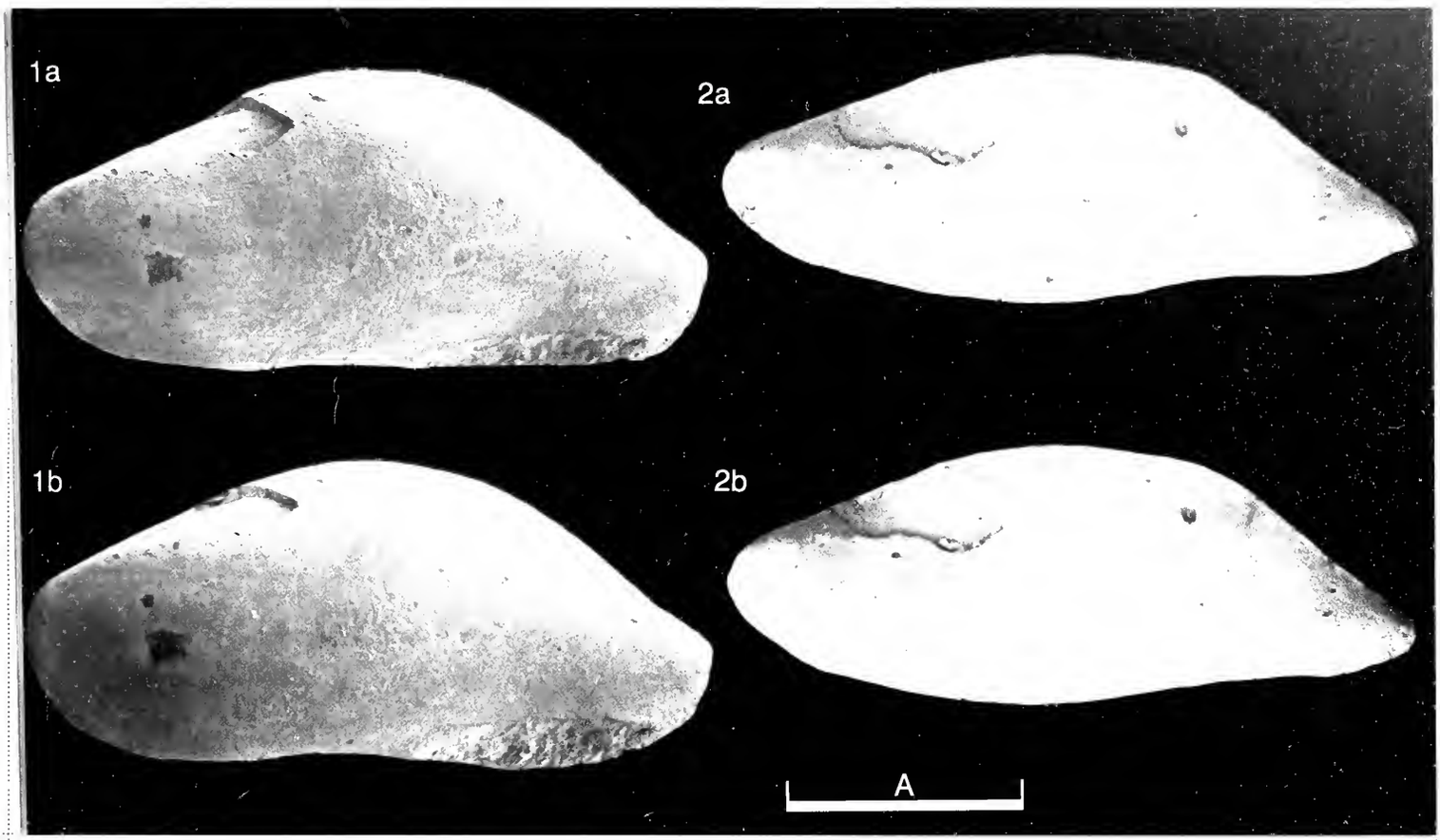
Remarks: *Bairdia curtus* (= *curta*) was originally described by F. M'Coy (1844, 164) from a collection made by Sir Richard Griffith. Later, the type specimen was freed from limestone matrix and redescribed by Jones & Kirkby (1879, 567-568). Subsequently, M'Coy's material was lost and is not to be found either in Irish or British museums (see Becker *et al.*, 1989, 29). Now, the lower Carboniferous sections in the vicinity of Granard, the type locality, have been investigated with the intention of replacing the lost holotype of *Bairdia curta* with a neotype (Becker *et al.*, 1989, 1990). A specimen clearly corresponding to Jones & Kirby's drawings (1879, pl. 28, figs. 1, 2) has now been identified and is figured herein. After collecting more material, it is intended that a neotype will be designated (see Becker *et al.*, 1990).

B. (Bairdia) submucronata Jones & Kirkby, 1879 might be the most closely related species to *B. curta (cf.* Becker *et al.*, 1990).

Distribution: Upper Tournaisian, lower Carboniferous of Ireland.

Explanation of Plate 17, 120

Figs. 1–4, adult LV, (**SMF Xe 14870,** 2280 µm long): fig. 1, ext. dors.; fig. 2, ext. vent.; fig. 3, ext. ant.; fig 4, ext. post. Scale (1000 µm; ×33), figs. 1–4.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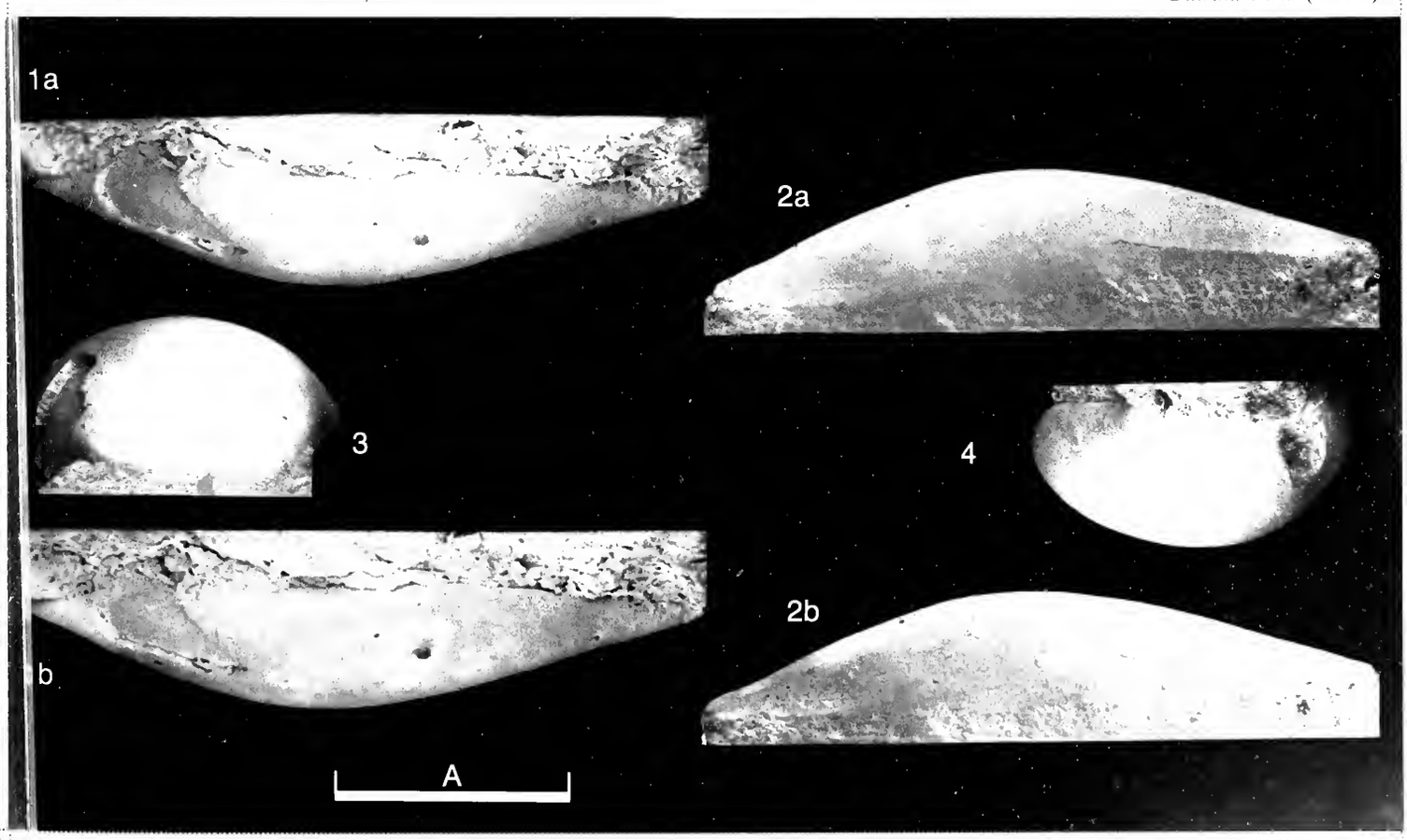
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595.337.14 (119.9) (520 : 161.139.35+161.135.34):551.351

ON *ROBUSTAURILA SALEBROSA* (BRADY)

by Noriyuki Ikeya & Namiko Hino
(Shizuoka University, Japan)

Genus *ROBUSTAURILA* Yajima, 1982

Type-species (original designation): *Cythereis assimilis* Kajiyama, 1913 (=*Cythere salebrosa* Brady, 1869).

1982 *Robustaurila* gen. nov., M. Yajima, *Bull. Univ. Mus. Tokyo,* **20,** 212.

Diagnosis: Carapace subrectangular in lateral view, subtriangular in anterior and posterior views. In lateral view, anterior broadly rounded, posterior truncate with distinct caudal process, ventral margin obscured by overhanging alae. Surface often coarsely pitted or reticulate; costate with 4 or 5 strong ridges radiating from the prominent subcentral node: anteriorly 2 or 3, posteriorly 2, with a prominent earlike projection on the ridge extending to the posterodosal corner. Hinge amphidont/heterodont with a bilobate posterior tooth in the RV and a smooth median element in the adult stage. Central muscle scars situated just inside the subcentral node: 4 adductor scars, the middle two generally subdivided, and 3 frontal scars. Sexual dimorphism weak; female somewhat larger and more inflated than male.

Remarks: In her original description of *Robustaurila*, Yajima (1982, *op. cit.*) designated *Cythereis assimilis* Kajiyama, 1913 as the type-species; however, her illustrated specimens belong to a different species, *R. ishizakii* (Okubo) (N. Ikeya & H. Hamada, *Stereo-Atlas Ostracod Shells,* **17,** 137-144, 1990). *Robustaurila* resembles *Mutilus* Neviani, 1928 (*Memorie Accad. pont. Nuovi Lincei,* ser. 2,

Explanation of Plate 17, 122

Figs. 1–3: ♂ car. (**IGSU–O–784,** 730 μm long); fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100 μm; ×90), figs. 1–3.

11, 93) (see G. Ruggieri & P.C. Sylvester–Bradley. *Stereo-Atlas Ostracod Shells,* **1,** 109–116, 1973) in shape and surface ornamentation, but basically differs in having radial ridges arising from a subcentral node and in lacking the "tubular normal pore canals" given as a special generic definition for *Mutilus* by W. Sissingh (1972, *Utrecht micropaleont. Bull.,* **6,** 124). *Robustaurila* also has no "higher chimney-like structures and stellar tubercles" which are described on *Mutilus* by Ruggieri & Sylvester–Bradley (1973, *op. cit.*). All normal pores of *Robustaurila* have a sieve plate with a subcentral bristle opening, and are divided into two types based on the pore size and its situation on the valve surface; one has a large sieve plate (5–10 μm in diameter) with a short bristle in a depressed surface, and the other has a small sieve plate (3–4 μm in diameter) with a long bristle emanating from a raised surface. The number and distribution pattern of the latter small pores are quite constant in the genus, which in Japan comprises three species: the type-species, *R. ishizakii* (Okubo) and *R. kianohybrida* (Hu) (N. Hino & N. Ikeya, *Stereo-Atlas Ostracod Shells,* **17,** 129-136, 1990).

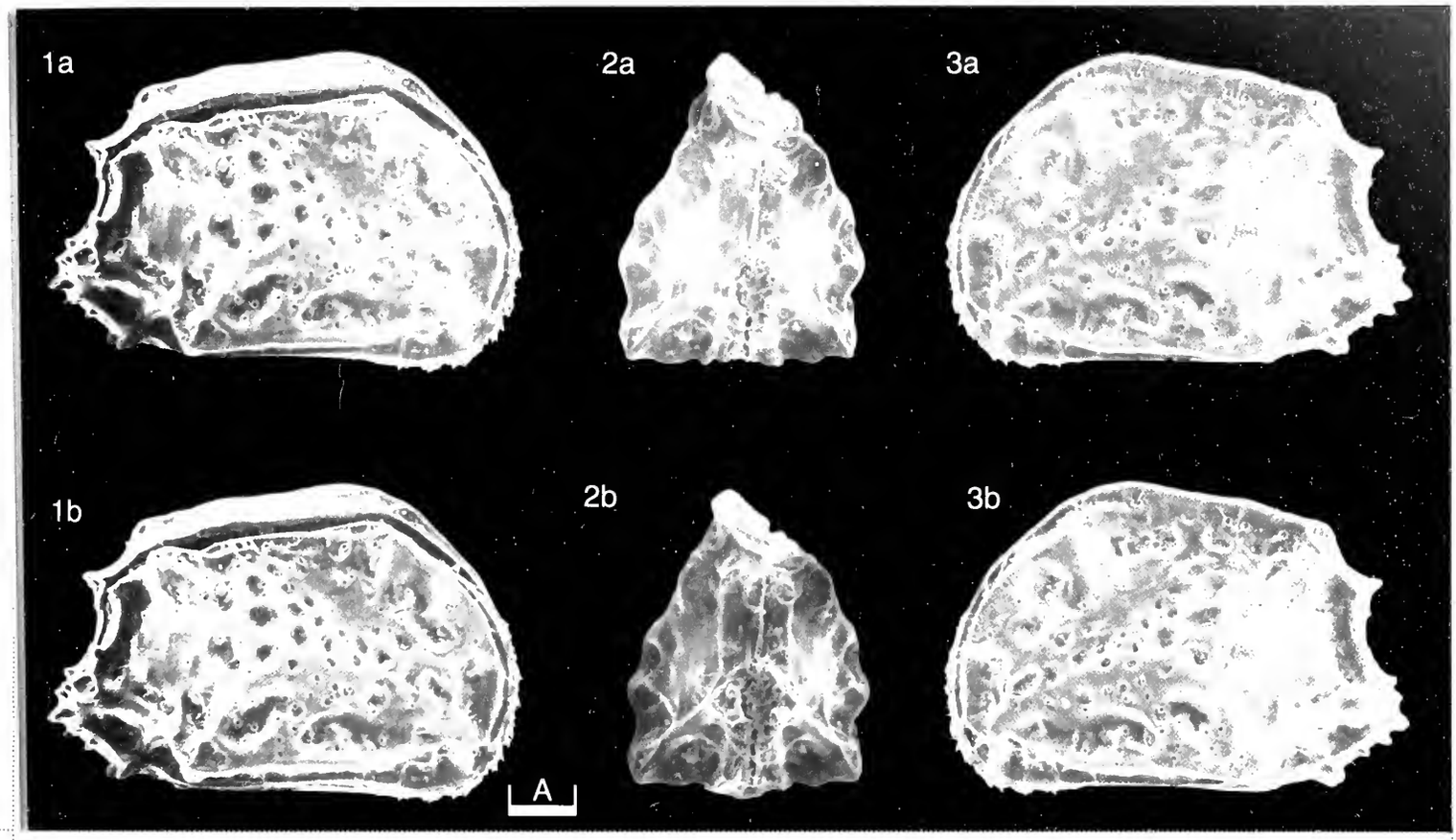
Distribution: Pliocene–Recent; Japan and its adjacent area.

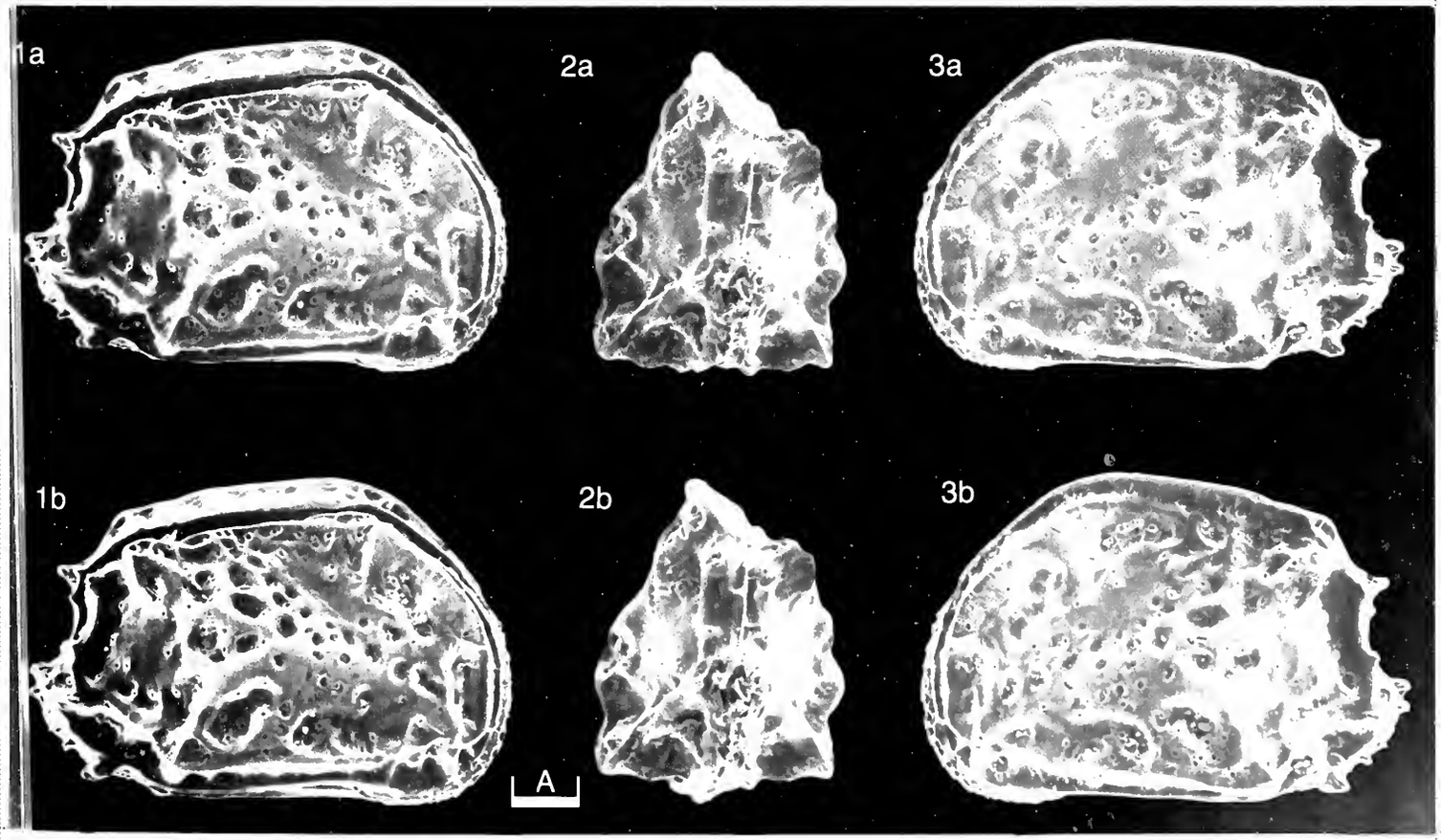
Robustaurila salebrosa (Brady, 1869)

1869 *Cythere salebrosa* sp. nov., G.S. Brady, *in:* L. De Folin & L. Perier (Eds.), *Les Fonds de la mer,* **1**(1), 158, pl. 16, figs. 8, 9.
1913 *Cythere assimilis* sp. nov., E. Kajiyama, *Zool. Mag. Tokyo (Dobutsugaku-zasshi),* **25,** 14, fig. 76.
1980 *Mutilus assimilis* (Kajiyama); I. Okubo, *Publs Seto mar. biol. Lab.,* **25**(5/6), 403–405, figs. 5a–f, 7a, b, 11a–d.
non 1982 *Robustaurila assimilis* (Kajiyama); M. Yajima, *Bull. Univ. Mus. Tokyo,* **20,** 212, pl. 13, figs. 6–8.
1987 *Mutilus* aff. *assimilis* (Brady) [*sic*]; Q. Wang & L. Zhang, *Acta oceanol. Sin.,* **6** (2), 285, 291, pl. 2, figs. 18–20.
1987 *Mutilus salebrosa* (Brady); R.C. Whatley & Q. Zhao, *J. micropalaeontol.,* **6**(2), 26, 28, pl. 2, figs. 13, 14.
1988 *Mutilus* aff. *assimilus* [*sic*] (Kajiama) [*sic*]; P. Ruan & Y. Hao. *in:* Research Party (Ed.), *Quaternary Microbiotics in the Okinawa Trough and their Geological Significance,* Geol. Publ. House (Beijing), 312, pl. 54, fig. 27.

Explanation of Plate 17, 124

Figs. 1–3: ♀ car. (**IGSU–O–785,** 740 μm long); fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100 μm; x90), figs. 1–3.


1a
2a
3a
1b
2b
3b
A


1a
2a
3a
1b
2b
3b
A

Holotype: Centre d'Etudes et de Recherches Scientifiques, Biarritz, France. no. **CERS 68.21.40** (illustrated by Whatley & Zhao, 1987, *op. cit.*); RV, sex unknown.

Type locality: Hong Kong (exact locality unknown). Recent.

Figured specimens: Institute of Geosciences, Shizuoka University (**IGSU**), nos. **O-784** (♂ car.: Pl. **17,** 122, figs. 1-3; Pl. **17,** 126, figs. 1, 2), **O-785** (♀ car.: Pl. **17**, 124, figs. 1-3; Pl. **17**, 126, figs. 3, 4), **O-786** (♀ car.: Pl. **17**, 128, figs, 1-3), **O-796** (♂ car., preparation, appendages: Text-fig. 1a, b). **O-784, 785** were collected with calcareous algae from Aburatsubo cove, Miura Peninsula, Kanagawa Pref., Japan (lat. 35°9.4′N, long. 138°36.8′E) in 1m water depth on April 28th, 1987. **O-786** was collected with calcareous algae from Osezaki, Izu Peninsula, Shizuoka Pref., Japan (lat. 35°1.5′N, long. 138°47.4′E) in 20m water depth on March 23rd, 1988. **O-796** was collected with calcareous algae from Tamano, Okayama Pref., Japan (lat. 34°32.6′N, long. 134°01.7′E) in the tidal zone on April 3rd, 1988.

Diagnosis: A large, subquadrate, less reticulate species of *Robustaurila* with strong radial ridges of which the posterodorsal one is sinuous. Reticulation almost disappearing in posterior area and above the subcentral node. Posterodorsally, cardinal angle sharp, with a distinct, small marginal spine in the left valve. Posteroventral margin with several denticles. Ventrolateral alae expanded posteriorly. In dorsal view, marginal rim relatively broad and flat. Left valve much higher than the right. The ejaculatory duct is bent.

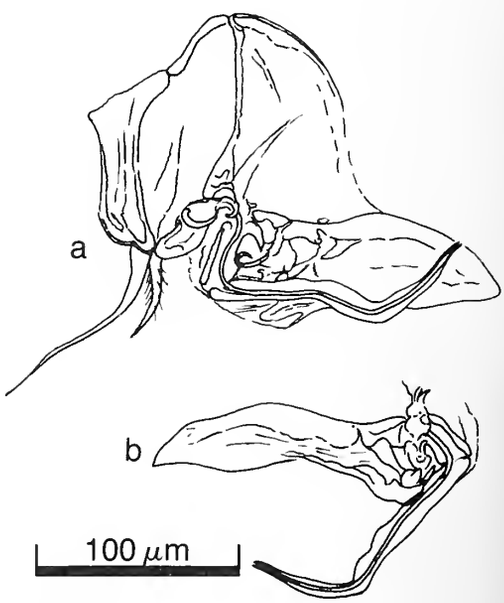
Remarks: The species is similar to *R. kianohybrida* (Hu) (N. Hino & N. Ikeya, *Stereo–Atlas Ostracod Shells,* **17,** 129–136, 1990,) except for its ornamentation. Brady's original illustrations (LV) correspond well with those of Okubo (1980, *op. cit.*, figs. 7b, d) and Wang & Zhang (1987, *op. cit.*, fig. 20). The SEM photos (RV) of the holotype designated by Whatley & Zhao (1987, *op. cit.*,) agree well with the illustration of Kajiyama (1913, *op. cit.*). The specimens illustrated in figs. 18, 19 of Wang

Explanation of Plate 17, 126

Figs. 1, 2, ♂ car. (**IGSU–O–784,** 730 μm long); fig. 1, dors.; fig. 2, vent. Figs. 3, 4, ♀ car. (**IGSU–O–785,** 740 μm long): fig. 3 dors.; fig. 4, vent.
Scale A (100μ ; x80), figs. 1–4.

& Zhang (1987) are identical with A–2 and A–1 instars, and the specimen of Ruan & Hao (1988, *op. cit.*) is regarded as an A–1 instar, in terms of the size of carapace and surface ornamentation. Appendages were described under the name of *Mutilus assimilis* by Okubo (1980, *op. cit.*, figs. 5a–f, 7a, b).

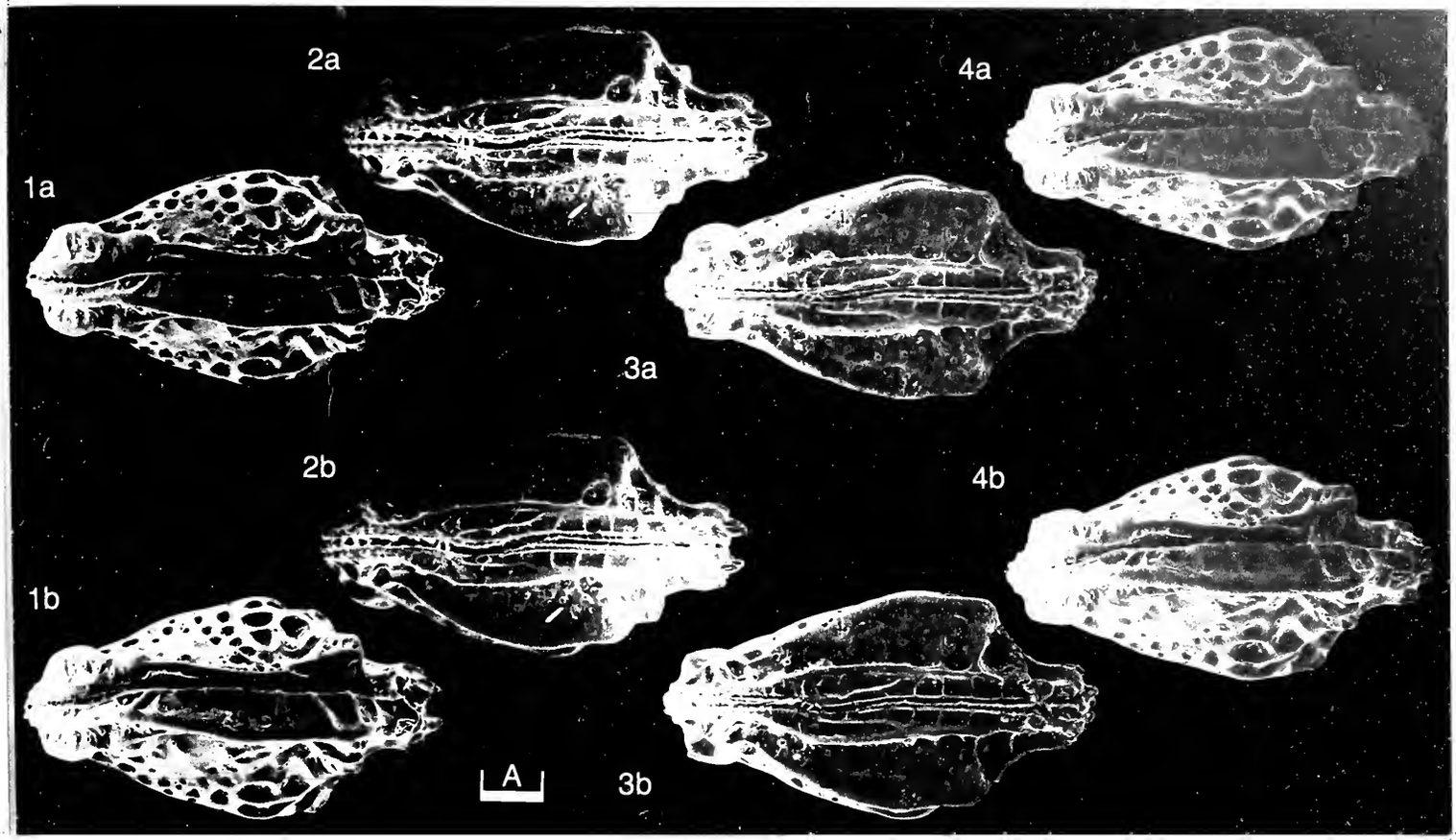
Distribution: Recent: A littoral marine species found in association with algae in depths of 0–20m, distributed along the coast of Japan and Hong Kong (Brady, 1869, *op. cit.*; Wang & Zhang, 1987, *op. cit.*).
Pleistocene: Hamada Fm., Aomori Pref.; Sawane Fm., Niigata Pref. (Sado Is.); Upper sediment of the core in the Okinawa Trough (St. 881: lat. 24°45′N, long. 126°20′E, 1405m in water depth) (Ruan & Hao, 1988, *op. cit.*).

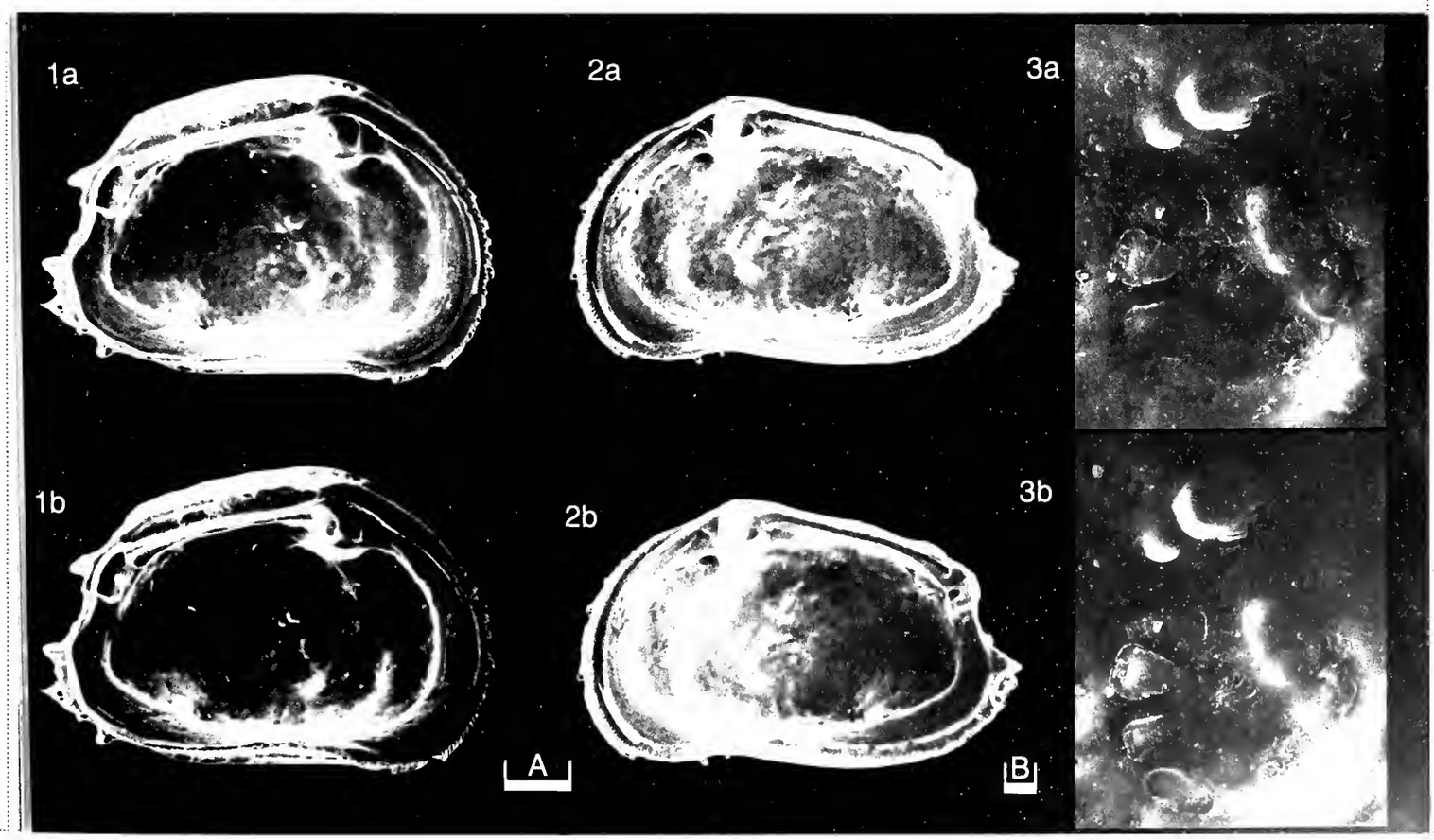


Text-figs. 1a, b, ♂ copulatory organs (**IGSU–O–796,** 730 μm long).

Explanation of Plate 17, 128

Figs. 1–3: ♀ car. (**IGSU–O–786,** 680 μm long); fig. 1, LV, int., lat.; fig. 2, RV, int. lat.; fig. 3, LV, int. musc. sc.
Scale A (100 μm; x90), fig. 1, 2; scale B (10 μm; x400), fig. 3.


2a
4a
1a
3a
2b
4b
1b
A
3b


1a
2a
3a
1b
2b
3b
A
B

595.337.14 (119.9) (520 : 161.133.33+161.135.34):551.351

ON *ROBUSTAURILA KIANOHYBRIDA* (HU)

by Namiko Hino & Noriyuki Ikeya
(Shizuoka University, Japan)

Robustaurila kianohybrida (Hu, 1982)

1968 *Mutilus* aff. *assimilus* [*sic*] (Kajiyama); K. Ishizaki, *Sci. Rept. Tohoku Univ.*, ser. 2 (Geol.), **40**(1), 24, pl. 5, figs. 9, 10.
1982 *Mutilus kianohybridus* sp. nov., C. H. Hu, *Q. Jl Taiwan Mus.*, **35**(3/4), 187–189, pl. 4, figs. 21, 26, text-figs. 9a, b.
1984 *Ambostracon metanodulose* sp. nov., C. H. Hu. *Jl Taiwan Mus.*, **37**(1), 94–95, pl. 2, figs. 15, 20, text-figs. 27a, b.
1986 *Ambostracon metanodulosa* [*sic*] Hu; C. H. Hu, *ibid.*, **39**(1), 119, pl. 18, figs. 5, 8, 9, 12.

Holotype: Nat. Hist. Mus. Taiwan Normal Univ. **TNUM 7283;** carapace; sex unknown.
Type locality: The west edge of the Hengchun-Table-land, near Shanhai-li, 3km west of the Hengchun City, Taiwan (approx. lat. 22°03′N, long. 120°45′E); Pleistocene.
Figured specimens: Institute of Geosciences, Shizuoka University (**IGSU**), nos. **O–790** (♂ car.: Pl. **17**, 130, figs. 1–3; Pl. **17,** 134, figs. 1, 2), **O–791** (♀ car.: Pl. **17,** 132, figs. 1–3; Pl. **17**, 134, figs. 3, 4), **O–792** (♀, car.: Pl. **17,** 136, figs. 1–3), **O–793** (♂ car., preparation, appendages: Text-fig. 1a–d; Text-fig. 2a–c), **O–794** (♂ car., preparation, appendages: Text-fig. 2d, e). **O–790, 791, 792** were collected with calcareous algae from Takaura, Satamisaki Peninsula, Ehime Pref., Japan (lat. 33°27.4′N, long. 132°16.1′E) in 2m water depth on June 28th, 1984. **O–793, 794** were collected with calcareous

Explanation of Plate 17, 130

Figs. 1–3: ♂ car. (**IGSU–O–790**, 740 µm long); fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100 µm; ×90), figs. 1–3.

algae from Unarizaki, Awaji-shima, Hyogo Pref., Japan (lat. 34°16.7′N, long. 134°39.8′E) in 1m water depth on July 1st, 1984.

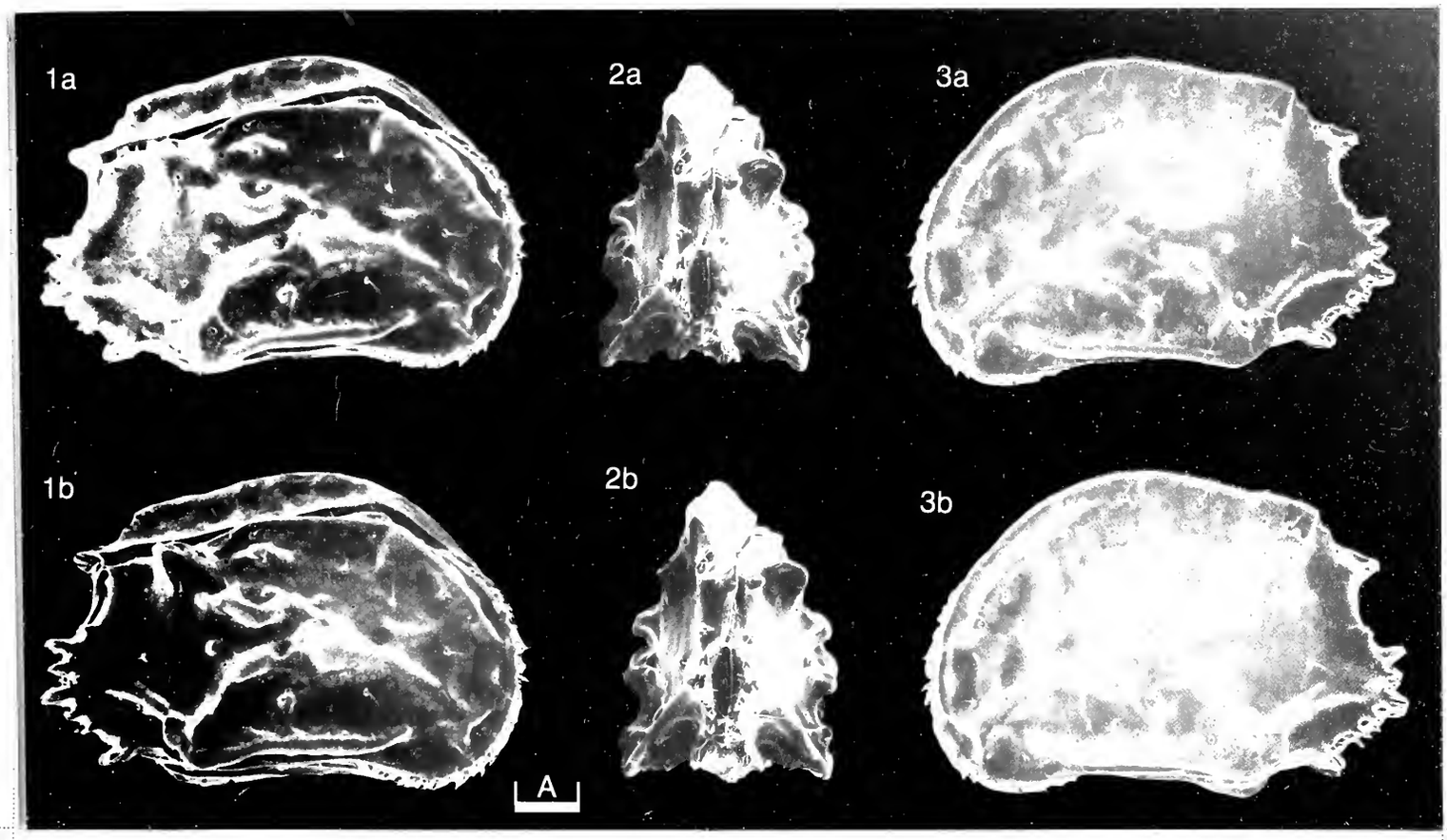
Diagnosis: A large, subquadrate, simple skeletally ornamented species of *Robustaurila* with strong radial ridges and some tubercles on a smooth surface. Posterodorsal ridge strongly sinuous, anteroventral one most prominent. Posterodorsally, cardinal angle sharp, with a distinct, small marginal spine in the left valve. Posteroventral margin with several denticles. Ventrolateral alae sharply curved posteriorly. In dorsal view, marginal rim broad and flat. Left valve much higher than the right. The ejaculatory duct is bent with a widened base.

Remarks: The species is very similar to *R. salebrosa (Brady)* (N. Ikeya & N. Hino, *Stereo–Atlas Ostracod Shells*, **17,** 121–128, 1990) except for its skeletal ornamentation. Although the type specimen seems to have lost the point of the caudal process and some detail of the ornamentation (as often observed in weathered material), it corresponds with well-preserved Japanese specimens in other morphological characters. Hu's material (1984, *op. cit.*, **TNUM 8137**) designated as *Ambostracon metanodulose* is correspondent with the A–1 instar of *R. kianohybrida* in size and morphological characters, which are faint reticulations, nodulous radiating ridges and some knobs. Hu's (1986, *op. cit.*, figs. 5, 8, 9 and 12) specimens also correspond with A–2 and A–3 instars of this species, which have the characteristic faint reticulation in the posterior area.

Distribution: Recent: A littoral marine species found in association with algae in depths of 0–20m, distributed along the Pacific coast of Japan. Pleistocene: known only from Taiwan (Hengchung Fm., Ssukon Fm., and Tungshiao Fm.) (Hu, 1982, 1984, 1986, *op. cit.*).

Explanation of Plate 17, 132

Figs. 1–3, ♀ car. (**IGSU–O–791,** 740 µm long); fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100 µm; ×90), figs. 1–3.


1a
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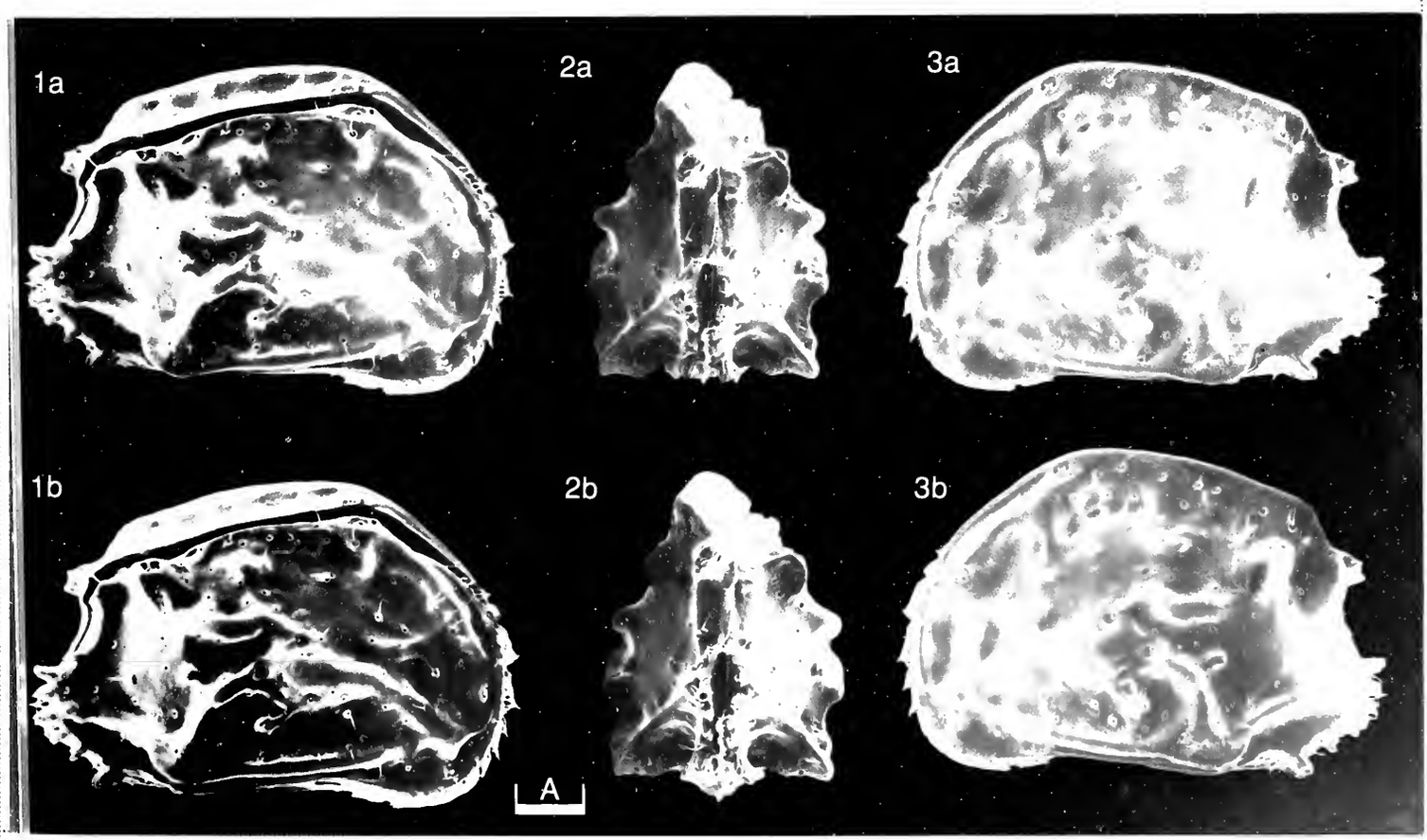
3a
1b
2b
3b
A


1a
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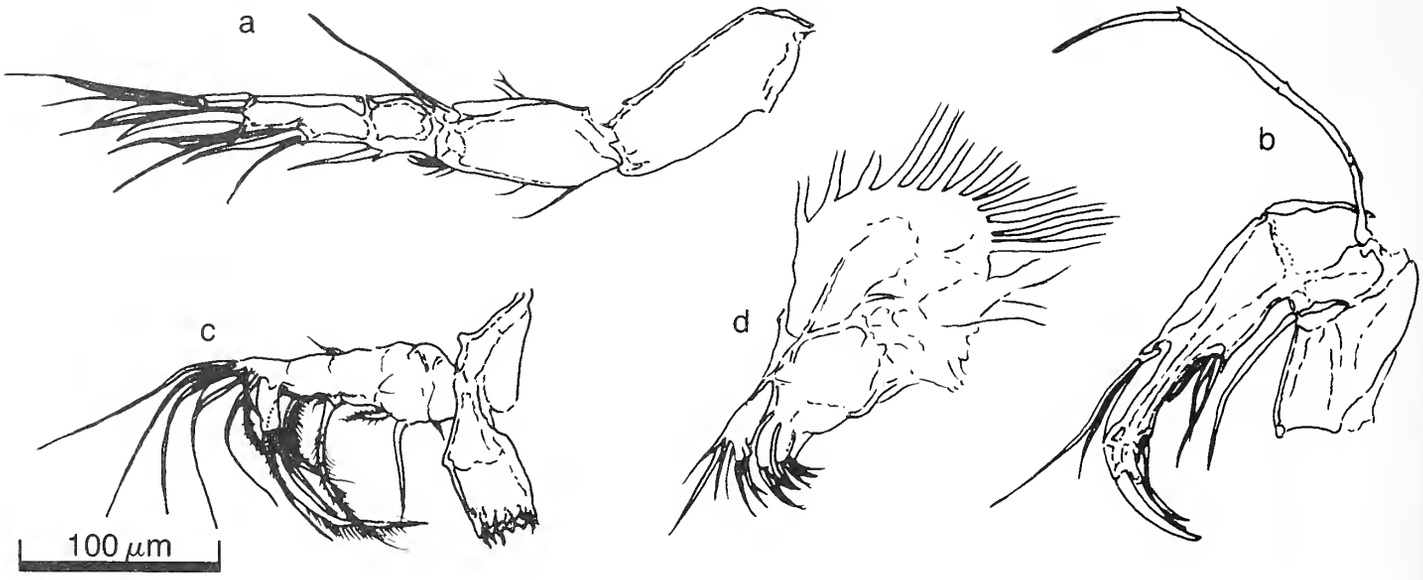
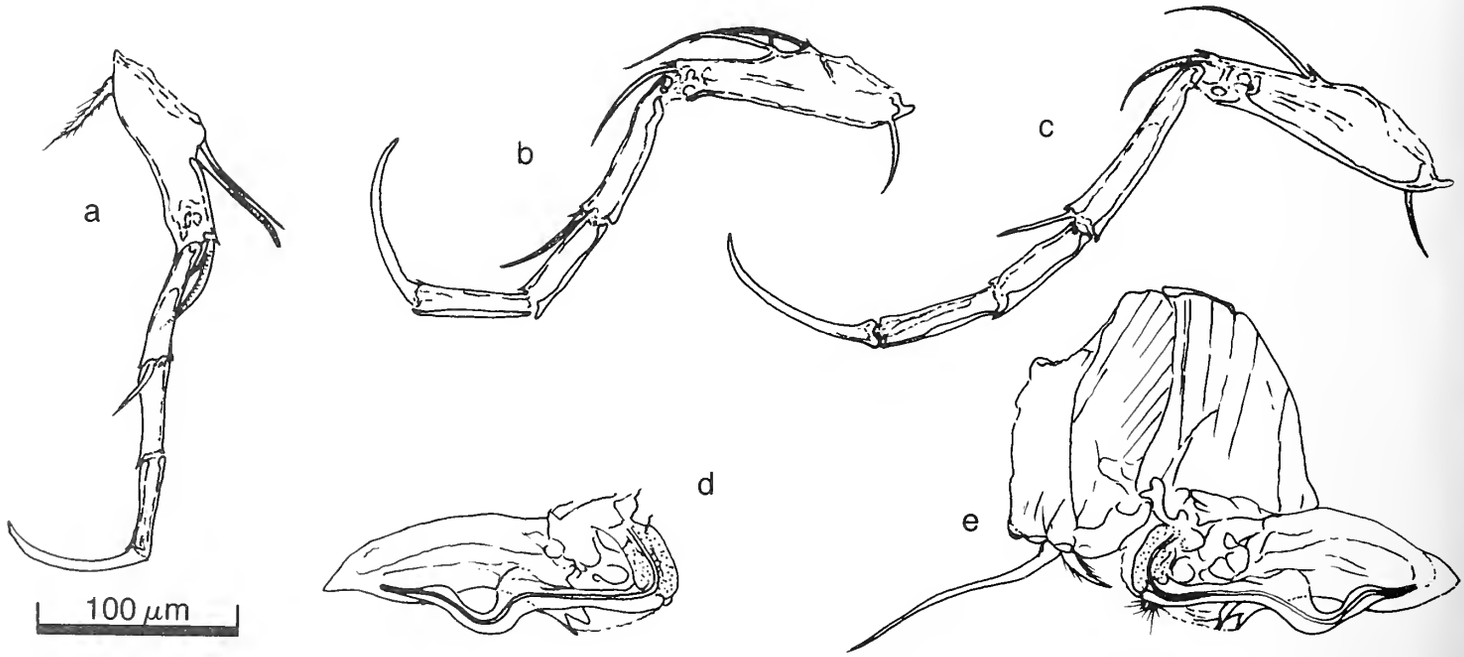
3a
1b
2b
3b
A



Text-fig. 1a–d, ♂ appendages (**IGSU–O–793,** 670 µm long): a, antennula; b, antenna; c, mandibula; d, maxillula.

Explanation of Plate 17, 134

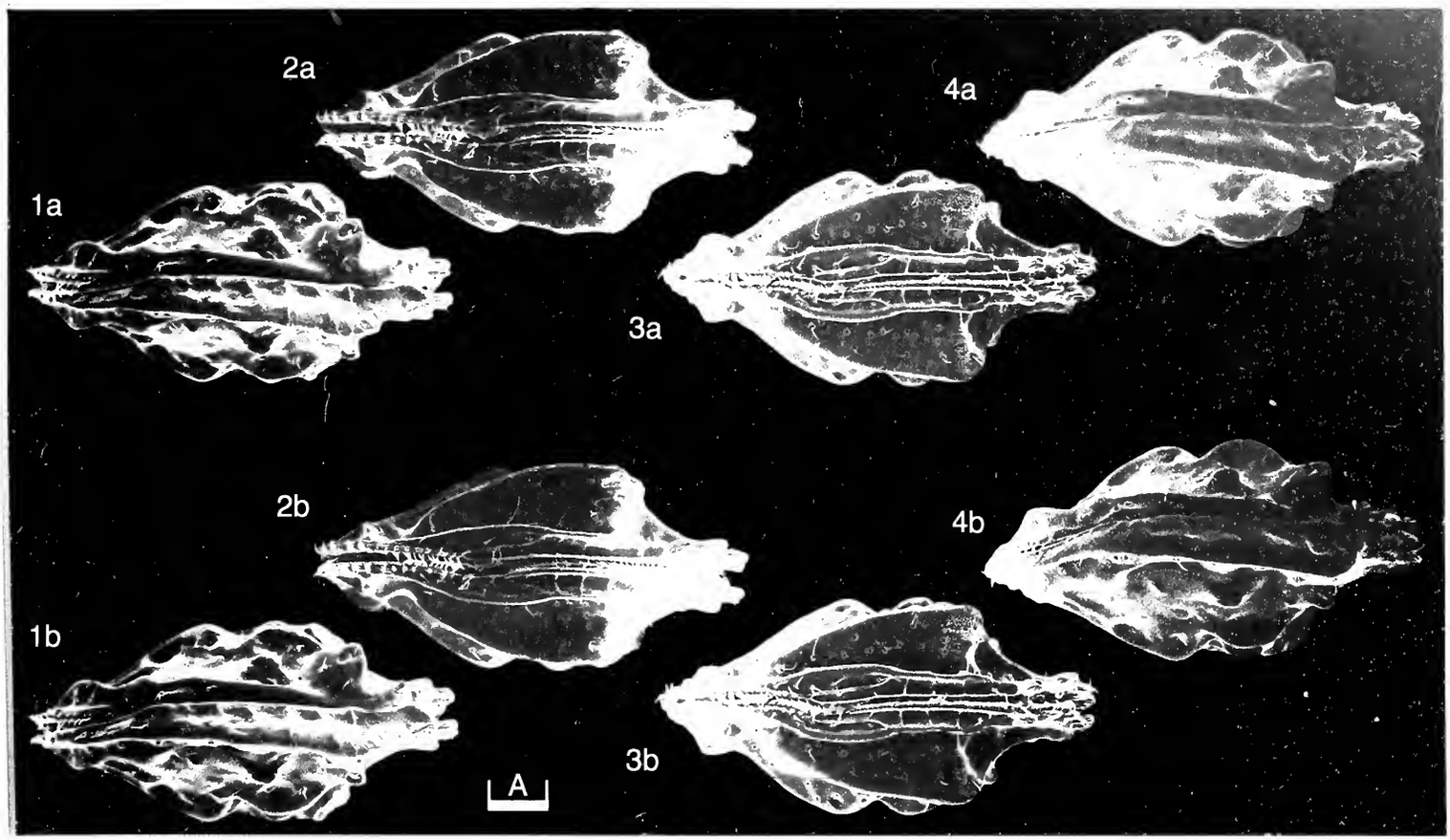
Figs. 1, 2, ♂ car. (**IGSU–O–790,** 740 µm long); fig. 1, dors.; fig. 2, vent. Figs. 3, 4, ♀ car. (**IGSU–O–791,** 740 µm long): fig. 3, dors.; fig. 4, vent.
Scale A (100 µm; ×80), figs. 1–4.

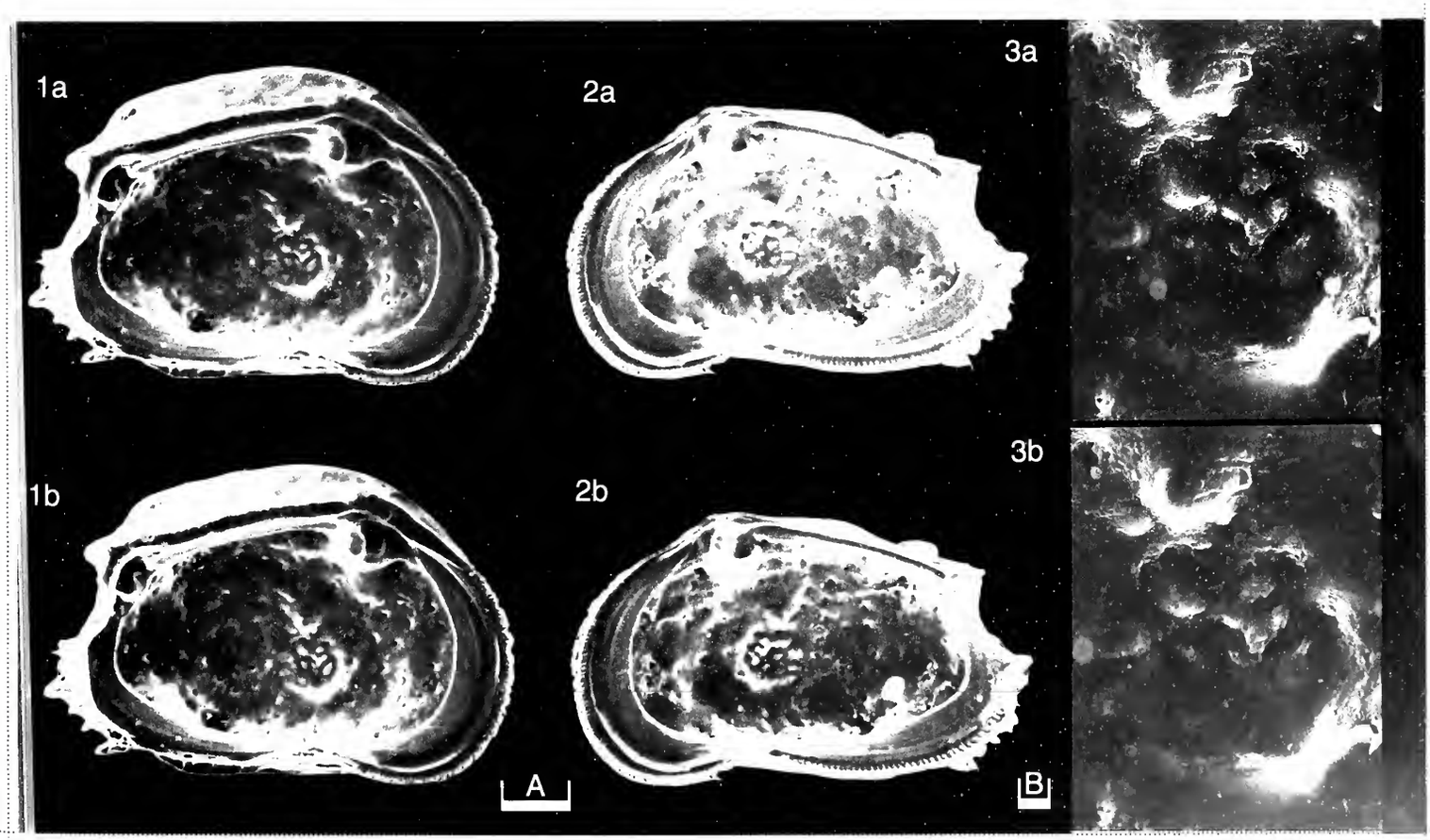


Text-fig. 2a–c, ♂ appendages (**IGSU–O–793,** 670 µm long): a, 1st leg.; b, 2nd leg.; c, 3rd leg. 2d, e, ♂ copulatory organs (**IGSU–O–794,** 700 µm long).

Explanation of Plate 17, 136

Figs. 1–3, ♀ car. (**IGSU–O–792,** 700 µm long); fig. 1, LV, int. lat.; fig. 2, RV, int. lat.; fig. 3, LV, int. musc. sc.
Scale A (100 µm; ×90), figs. 1, 2; scale B (10 µm; ×400), fig. 3


2a
4a
1a
3a
2b
4b
1b
3b
A


1a
2a
3a
1b
2b
3b
A
B

595.337.14 (119.9) (520 : 161.139.35+161.134.33):551.351

ON *ROBUSTAURILA ISHIZAKII* (OKUBO)

by Noriyuki Ikeya & Hirotaka Hamada
(Shizuoka University, Japan)

Robustaurila ishizakii (Okubo, 1980)

1961 *Mutilus* sp., T. Hanai, *J. Fac. Sci. Tokyo Univ.*, sec. 2, **13**(2), 372, 373, text-figs. 13–1a, b.
1968 *Mutilus* sp. A, K. Ishizaki, *Sci. Rept. Tohoku Univ.*, ser. 2 (Geol), **40**(1), 25, pl. 5, fig. 18.
1971 *Mutilus assimilus* [*sic*] (Kajiyama); K. Ishizaki, *ibid.*, **43**(1), 83, pl. 3, fig. 14.
1980 *Mutilus ishizakii* sp. nov., I. Okubo, *Publs Seto mar. biol. Lab.*, **25**(5/6), 405-408, figs. 6a-i, 7c, d, 11e-g.
1981 *Mutilus* sp., S. Hiruta, *Seibutsu-kyozai,* **16,** 17, 18, fig. 8(4).
1982 *Robustaurila assimilis* (Kajiyama); M. Yajima, *Bull. Univ. Mus. Tokyo;* **20,** 212, Pl. 13, figs 6-8.
1982 *Mutilus assimilus* [sic] (Kajiyama); Y. Hou *et al.*, in*: Cretaceous Quaternary Ostracode Fauna from Jiangsu,* Geol. Publ. House (Peking), 178, pl. 75, figs. 18-22.
1985 *Mutilus assimilis* (Kajiyama); N. Ikeya *et al.*, in*: Guidebook of Excursions,* 9th ISO (1985, Shizuoka), no. 4, pl. 4, figs. 16, 17.
1985 *Mutilus assimilis* (Kajiyama); K. Ishizaki & Y. Matoba, *ibid.*, no. 5, pl. 5, fig. 5.
1987 *Mutilus assimilus* [*sic*] (Kajiyama); S. Zheng, *Mem. Nanjing Inst. Geol. Palaeont. Acad. sin.*, **23,** 197, pl. 4, figs. 16-18.
1988 *Mutilus assimilis* (Kajiyama); P. Wang *et al.*, in*: Foraminifera and Ostracoda in Bottom Sediments of the East China Sea,* China Ocean Press (Beijing), 253. pl. 47, figs. 5, 6.

Explanation of Plate 17, 138

Figs. 1-3, ♂ car. (**IGSU–O–787,** 620μm long): fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100 μm; ×100).

1988 *Aurila* sp. C, K. Paik & E. Lee, *in*: T. Hanai *et al.*, (Eds.), *Evolutionary Biology of Ostracoda,* 9th ISO (1985, Shizuoka), Kodansha-Elsevier, 550, pl. 2, fig. 6.

Holotype: Nat. Sci. Mus. Tokyo, **MO–818;** carapace and appendages; Male.

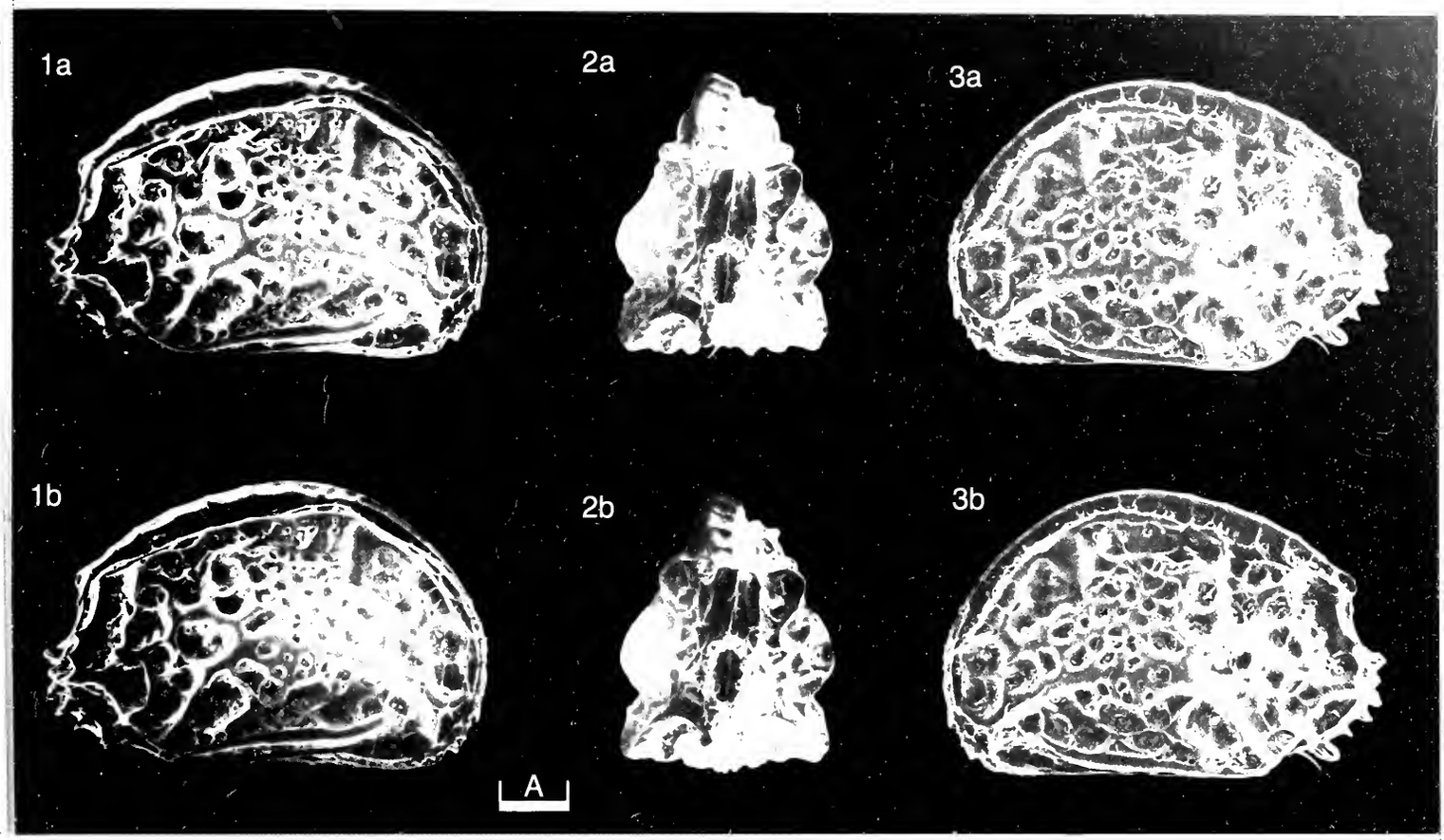
Type locality: Intertidal zones of rocky shores, Iwaki, Kurashiki City, Okayama Pref. (lat. 34°29.4′N, long. 133°37.5′E.); Recent.

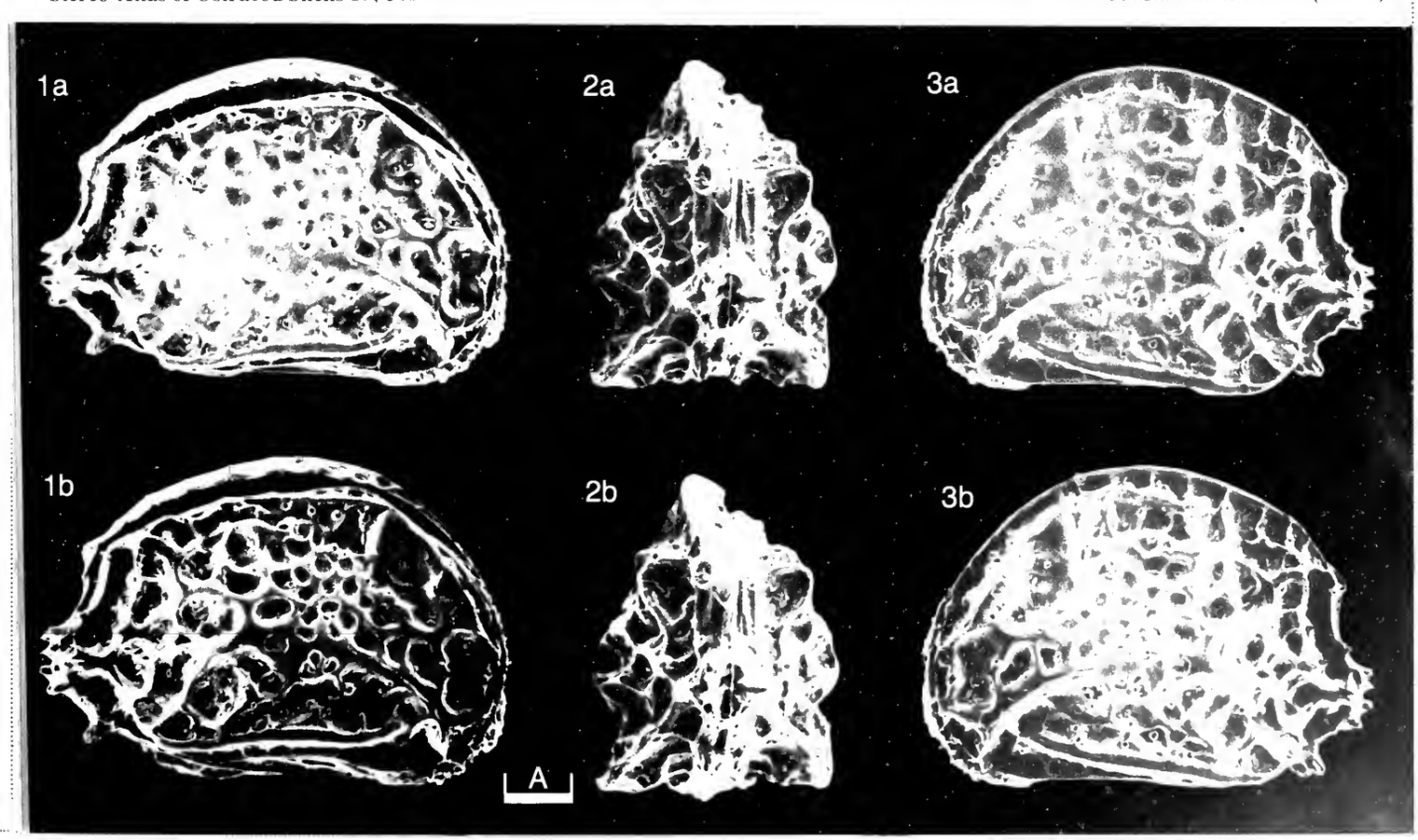
Figured specimens: Institute of Geosciences, Shizuoka University (**IGSU**), nos. **O–787** (♂ car.: Pl. **17**, 138, figs. 1–3; Pl. **17,** 142, figs. 1, 2), **O–788** (♀ car.: Pl. **17,** 140, figs. 1–3; Pl. **17**, 142, figs. 3, 4), **O–789** (♀ car.: Pl. **17,** 144, figs. 1–3), **O–795** (♂ car., preparation, appendages: Text-fig. 1a, b.). **O–787, 788, 789** were collected with calcareous algae from Alburatsubo Cove, Miura Peninsula, Kanagawa Pref., Japan (lat. 35°9.4′N, long. 138°36.8′E) in 1m water depth on April 28th, 1987. **O–795,** was collected with calcareous algae from Inomisaki, Kochi Pref., Japan (lat. 33°01.5′N, long. 133°06.0′E) in the tidal zone on June 29th, 1984.

Diagnosis: A small, anterodorsally arched, coarsely and irregularly reticulate species of *Robustaurila* with somewhat strong radial ridges. The ridge radiating to the posterodorsal corner is highly sinuous. Posterodorsal marginal spine absent. Posteroventral margin with several denticles. Ventrolateral alae gently curved. In dorsal view, marginal rim relatively narrow. Left valve somewhat higher than the right. The ejaculatory duct is comparatively straight.

Explanation of Plate 17, 140

Figs. 1-3, ♀ car. (**IGSU–O–788,** 670μm long): fig. 1, ext. rt. lat.; fig. 2, post.; fig. 3, ext. lt. lat.
Scale A (100μm; ×100).


1a
2a
3a
1b
2b
3b
A

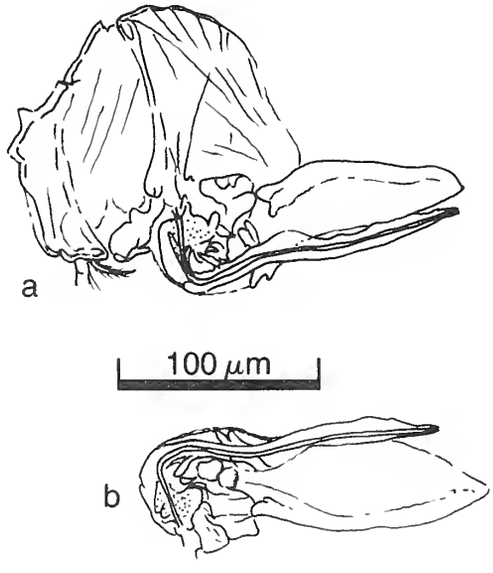

1a
2a
3a
1b
2b
3b
A

Remarks: Although *Mutilus* sp. A (Ishizaki, 1968, *op. cit.)* has more fine reticulation and weaker radial ridges, the characters of the outline and the reticulation pattern closely resemble those of the present species. The specimens illustrated as the type-species of *Robustaurila, R. assimilis* Kajiyama, 1913, by Yajima (1982, *op. cit.*), actually belong to this species. Appendages were described by Okubo (1980, *op. cit.*, figs. 6c-i, 7c, d).

Distribution: Recent: A littoral marine species found in association with algae in depths of 0–5m, widely along the coast of Japan and its adjacent areas. Pleistocene: Sasaoka Fm., Akita Pref. (Ishizaki & Matoba, 1985, *op. cit.*); Sawane Fm., Niigata Pref. (Sado Is.); Kiyokawa Fm., Chiba Pref. (Yajima, 1982, *op. cit.*); Miyata Fm., Kanagawa Pref.; Furuya Fm., Shizuoka Pref.; Sugwipo Fm., Korea (Paik & Lee, 1988, *op. cit.*); China (Hou et al., 1982, *op. cit.*; Zheng, 1987, *op. cit.*). Pliocene: Setana Fm., Hokkaido (Hanai, 1961, *op. cit.*); Tonohama Fm., Kochi Pref.

Explanation of Plate 17, 142

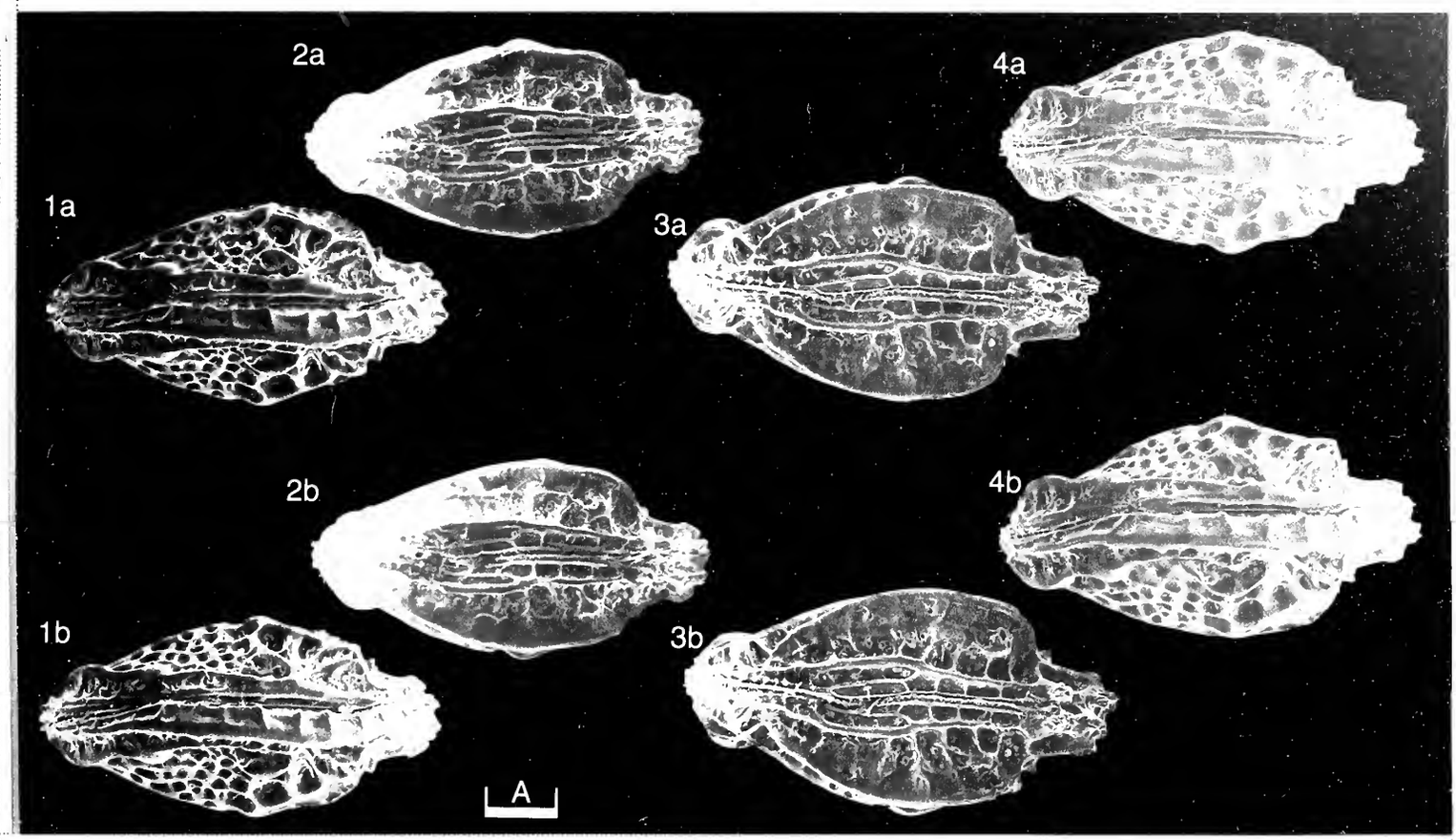
Figs. 1, 2, ♂ car. (**IGSU–O–787,** 620 μm long): fig. 1, dors.; fig. 2, vent. Figs. 3, 4, ♀ car. (**IGSU-O-788**, 670 μm long): fig. 3, vent.; fig. 4, dors.
Scale A (100 μm; ×90), figs. 1–4.

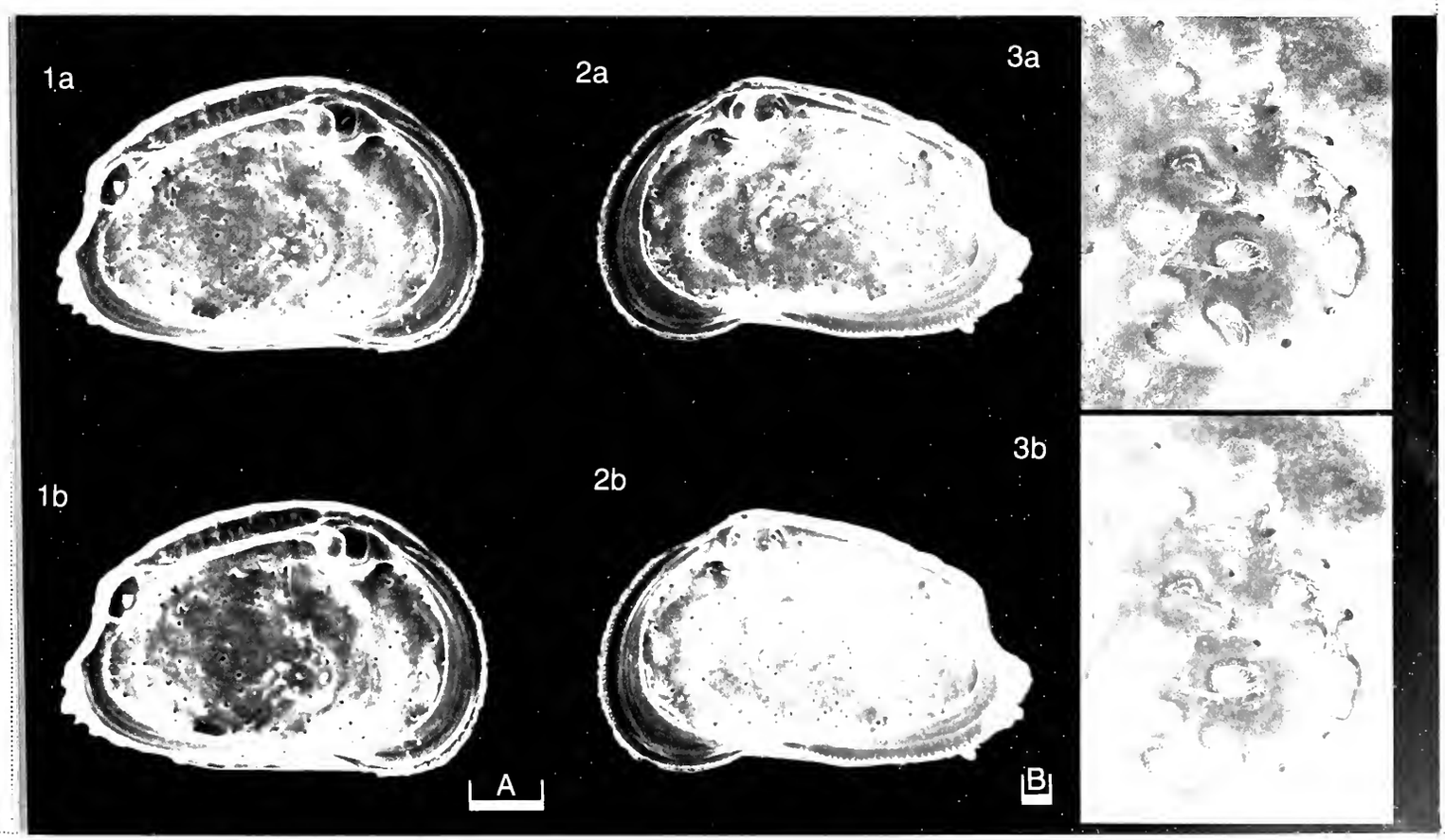


Text-Figs. 1a, b, ♂ copulatory organ (**IGSU–O–795,** 600 μm long).

Explanation of Plate 17, 144

Figs. 1–3, ♀ car. (**IGSU–O–789,** 600 μm long); fig. 1, LV, int. lat.; fig. 2, RV, int. lat.; fig. 3, LV, int. musc. sc.
Scale A (100 μm; ×100), figs. 1, 2; scale B (10μm; ×440), fig. 3.


2a
4a
1a
3a
2b
4b
1b
3b
A


1a
2a
3a
1b
2b
3b
A
B

595.337.14 (119.1) (759 : 162.080.26):552.54

ON *MALZELLA BELLEGLADENSIS* (KONTROVITZ)

by Mervin Kontrovitz & Jerry Marie Slack
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Malzella bellegladensis (Kontrovitz, 1978)

1978 *"Aurila" bellegladensis* sp. nov. M. Kontrovitz, *Tulane Stud. Geol. Paleont.*, **14,** 143-144, pl. 3, figs. 4, 5.
1983 *Malzella belleglandensis* (Kontrovitz); J.E. Hazel, *Smithson. Contr. Paleobiol.*, **53,** 105.

Holotype: U.S. National Museum (USNM), Washington, D.C., U.S.A., no. **USNM 235996;** left valve. [Paratypes nos. **USNM 235997–236000**]

Type locality: Florida, U.S.A.; pit just south of Belle Glade, Palm Beach County; approx. lat. 26°39′N, long. 80°37′W, Pleistocene (Tulane University Locality [TU] 201; Vokes, *Tulane Stud. Geol Paleont.*, **5,** 162, 1967); lime mud (Folk, *Mem. Am. Ass. Petrol. Geol.*, **1,** 62-84, 1962).

Figured specimens: Department of Geosciences, Northeast Louisiana University (NLUGEO) nos. **NLUGEO 1025** (LV adult: Pl. **17,** 146, fig. 3; Pl. **17,** 148, fig. 1), **1026** (RV adult: Pl. **17,** 146, fig. 1; Pl. **17,** 148, fig. 3), **1027** (LV juvenile: Pl. **17,** 146, fig. 2), **1028,** (internal mold, ocular region, LV adult: Pl. **17,** 148, fig. 2). Specimens are from the type locality.

Explanation of Plate 17, 146

Figs. 1, RV, ext. lat. (**NLUGEO 1026,** 630μm long): fig. 2. juv. LV. ext. lat. (**NLUGEO 1027,** 546 μm long); fig. 3, LV, ext. lat. (**NLUGEO 1025,** 658 μm long).
Scale A (250 μm; ×98), figs. 1-3.

Diagnosis: Distinguished by having the greatest height in front of mid-length, a highly arched dorsum, distinct eyespots, polished-appearing ridges, polygonal fossae, and a blunt caudal process of right valve.

Remarks: This species differs from *Malzella floridana* (Benson & Coleman) (*Paleont. Contr. Univ. Kans.*, Arthropoda, Art. **1,** 35-36, pl. 8, figs. 10-12, text-fig. 21, 1963) in having more subdued, polished-appearing ridges as ornamentation, polygonally-shaped fossae, a more highly and evenly arched dorsum, and by its smaller size. In *M. floridana* the anterior half has rectangular fossae, with dominant horizontal ridges.

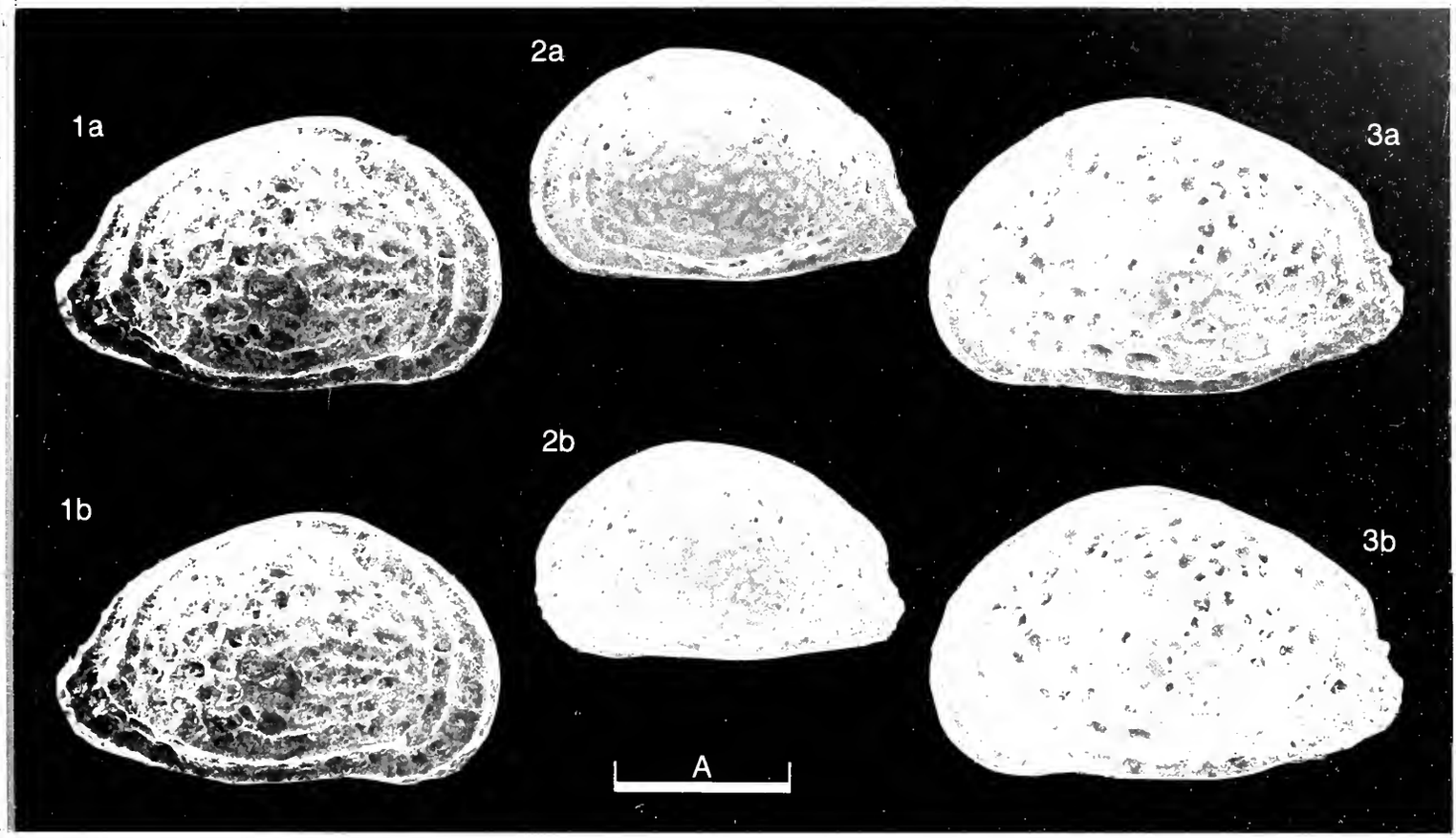
This species differs from *Malzella conradi* (Howe & McGuirt) *californica* (Benson & Kaesler) (R.H. Benson & R.L. Kaesler, *Paleont. Contr. Univ. Kans.*, Arthropoda, Art. **3,** 23-23, pl. 1, figs. 9, 10, text-fig. 12, 1963) in having a blunt, not pointed, caudal process in the right valve, a less distinct posterventral ridge, larger and more distinct eyespots, a distinct posterior cardinal angle of the left valve, and a more evenly arched dorsum of the right valve.

The ocular sinus of *M. belleglandensis* is similar to most members of the genus; it is elongate parallel to the long axis of the shell, has a minor constriction that gives it a stalked appearance, and has a shallow, terminal concavity that is the complement of the convexity of the eyespot's inner surface (Kontrovitz, *Trans. Gulf Cst Ass. geol. Socs,* **35,** 428, 1985).

Distribution: Reported from semi-consolidated lime muds from south Florida (type locality, TU 201).

Explanation of Plate 17, 148

Figs. 1. LV, int. lat. (**NLUGEO 1025,** 658 μm long); fig. 2, internal mould, adult LV ocular region, lat. (**NLUGEO 1028**); fig. 3, RV, int. lat. (**NLUGEO 1026**, 630 μm long).
Scale A (250 μm; ×98), figs. 1, 3; scale B (50 μm; ×490), fig. 2.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2a
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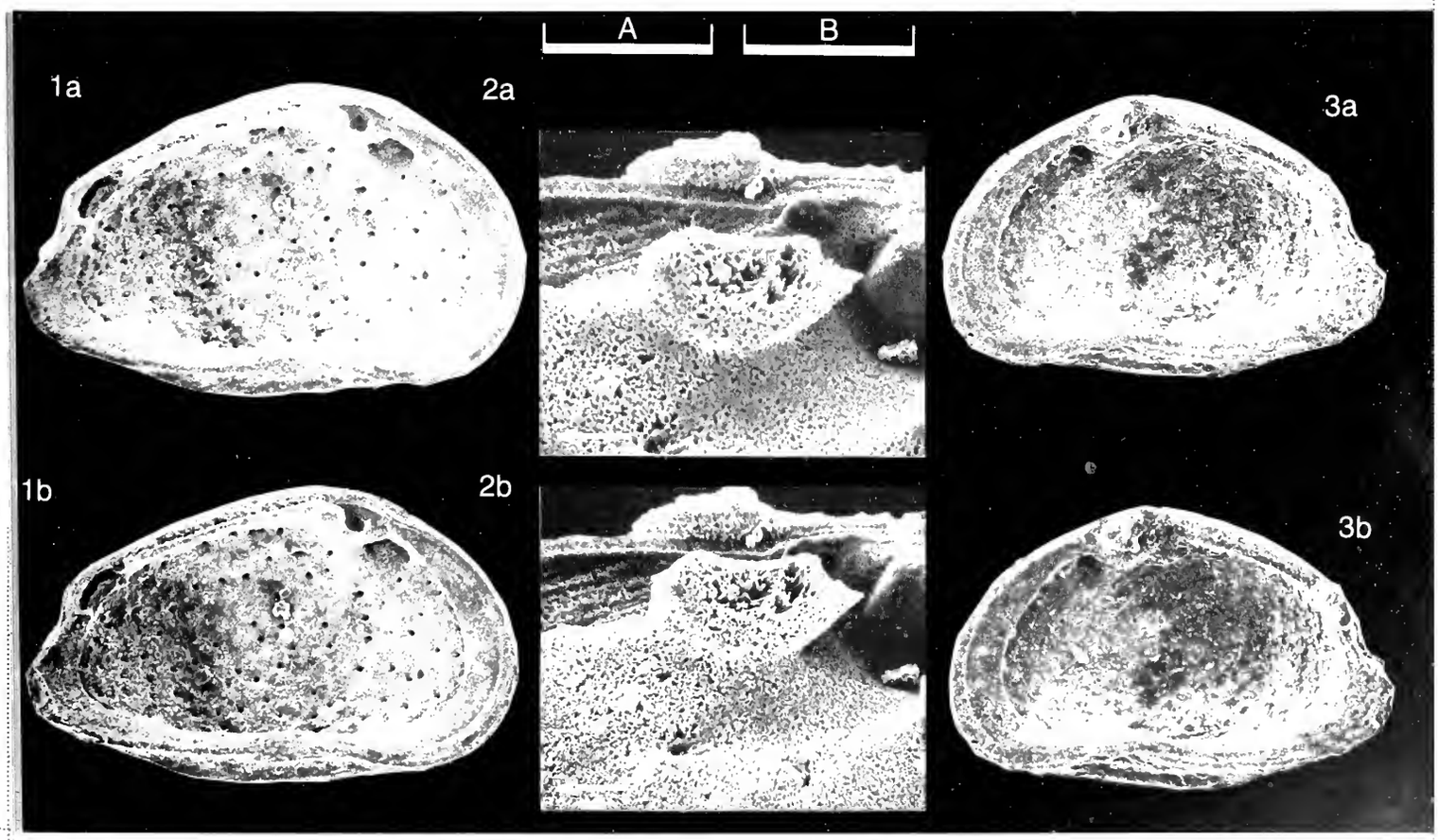
3b
A


A
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1a
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2b
3b

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